Field Scientific Report

Gendered Food Mapping on Boiled Cassava in Uganda

Understanding the Drivers of Trait Preferences and the Development of Multi-user RTB Product Profiles, WP1

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Ethics: The activities, which led to the production of this document, were assessed and approved by the CIRAD Ethics Committee (H2020 ethics self-assessment procedure). When relevant, samples were prepared according to good hygiene and manufacturing practices. When external participants were involved in an activity, they were priorly informed about the objective of the activity and explained that their participation was entirely voluntary, that they could stop the interview at any point and that their responses would be anonymous and securely stored by the research team for research purposes. Written consent (signature) was systematically sought from sensory panelists and from consumers participating in activities.

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ABSTRACT

Step 2 of the WP1 component aimed at identifying cassava quality attributes preferred by end-users along the cassava value chain in Uganda in order to provide breeders with criteria for trait prioritization. A descriptive survey employing mixed methods of data collection was conducted in Luweero and Apac districts to understand the perceptions of men and women on quality attributes of cassava. In addition, a market survey was conducted in Luweero, Apac and Kampala districts to understand quality attributes of fresh cassava roots. Results indicated that generally for men and women in both districts, local landraces were preferred due to their inherent quality attributes namely; sweet taste, easy to peel, cook fast, soft after boiling, white boiled roots, and big roots. Furthermore, the top three attributes for both men and women were disease resistance, high yield and sweet taste. Nonetheless, women identified drought tolerance and softness of boiled roots as highly preferred attributes, while men prioritized long in-ground storability and marketable roots. For the marketing survey, quality cassava root attributes preferred by traders were: big and slender roots, pink outer skin colour, soft, sweet and non-fibrous roots when chewed, roots with white flesh, and easy to peel roots. It was noted that women resident in urban areas were ranked as the main buyers of cassava. Moreover, quantity of cassava roots traded varied between seasons. Transportation, exposure to sunshine and poor handling were key reasons for post-harvest deterioration.

Key Words: Attributes, end-user, cassava, product profile and market.

SUMMARY

Socio-economic study

1. Cassava is grown by all wealth categories of men and women, but in different ways and circumstances, and thus likely to influence breeding priorities and/or distribution of new varieties.
2. People who are poor, who were noted to be predominately women and women who were heads of household, cultivated small land sizes on marginal soils. They practiced intercropping to maximise food output, often with beans and maize. They have few livestock to access fertiliser. It is important that new cassava varieties can thrive in these low-input conditions.
3. Men (in general), and wealthier farmers, typically monocrop during the dry seasons, while they practice intercropping typically with beans during the rainy season.
4. Wealthier men and women farmers have access to electricity which can increase their access to information and thus decision making.
5. Households differ in that some share a plot between husband and wife, while others divide the plot; however, it is more common for household members to share plots. In these contexts, it is particularly important for varieties to be developed that meet multiple use requirements as perceived and prioritised by both men and women.
6. Cassava is amenable to multiple products and thus uses namely: fresh cassava, boiled cassava, alcohol, pancakes, flour, leaves, mashed cassava, fried cassava chips, dried cassava chips; stem cuttings are also sold. Breeders must from the onset undertake breeding operations tagged to these end products. Stem cuttings are sold to earn income. Peels are not often used. In rare cases, peels are fed to animals. In this study use of peels was not important.
7. Cassava largely serves duo roles of major source of food and income. For example, in Apac district, there is a strong culture of cassava consumption and its importance as household food security crop. e.g. a cassava garden is required for a young man proposing to marry. In contrast, in Luwero, cassava is predominately sold to neighbouring urban centres and only consumed in times of food scarcity.
8. The most common and preferred varieties from the two regions (Apac and Luwero) for both men and women were: Nase 14, Bao, and NAROCASS 1. Overall, for both sexes and regions, local landraces were preferred due to their inherent preferred attributes: sweet taste, easy to peel, cook fast and soft after boiling, produce white boiled roots, have large roots, all coupled with stable texture and physiology irrespective of environmental changes. Farmers also liked released varieties but not to consume – but to sell stem cuttings to meet high demand from South Sudan government.
9. In Apac, local variety Bao was the most preferred for both men and women owing to its superior attributes tagged to boiled cassava. In Luwero, Nankinga also referred to as NASE 14 (officially released variety) ranked the best owing to early maturing. Another released variety NAROCASS1 was equally popular among women because it was good for making local brew and has high yields (these remarks were also observed in Apac).
10. Constraints associated with use of released varieties were limited availability, high cost of seed (stem cuttings) purchase, disease susceptibility, short in-ground storability, bitterness especially during dry season. In response to these challenges, farmers have opted to form groups to increase opportunities for access to improved planting materials through Government initiatives i.e. Operation Wealth creation.
11. Both men and women indicated that softness of boiled roots and in-ground storability in addition to high fresh yield, non-bitter roots, disease resistance, early maturity and drought resistance are the predominant attributes preferred by end users. This information provides

new insights to breeders involved in developing new cassava varieties that meet the needs of all end users, including consumers.

12. In Apac, cassava was prepared by peeling, chopping, immersing sliced cassava roots into water and boiling. In contrast, in Luweero the practice was peeling, slicing cassava roots, wrapping sliced roots in banana leaves and steaming. However, some people mash cassava roots upon boiling into a product locally called "*Mogo myeno"* in Apac or "*Mugunu*" in Luweero. Scrapping of the inner skin locally referred to as "kalakata" was a common practice in Luweero, but not practiced in Apac. Kukalakata is removing the smooth skin from cassava roots after peeling. It is part of culture here in the central. There is a belief that the smooth skin is associated with bitterness of the boiled product. This may be a stereotype.
13. Boiled cassava roots are often consumed with boiled common beans. Other accompaniments included fish, chicken, vegetables, groundnuts and/or beef soup. In Apac, boiled cassava is consumed daily a significant number of men and women resident in the communities. However, cassava is not often purchased as most residents grew it on their farms. In Luwerro, alternative staple foods were preferred for consumption notable of which included matooke, sweet potatoes and maize.
14. The most undesirable attributes of boiled cassava roots included: bitterness, hardness, fibrousness, disease susceptibility, yellow root colour, tasteless and watery boiled cassava.

Main findings from the market study

1. The majority of traders sourced cassava roots from more than one location; up to seven different places were documented.
2. Cassava root quality attributes preferred by traders included: big and slender roots, pink outer skin colour, soft, sweet and non-fibrous roots when chewed, roots with white flesh, and easy to peel roots. It suffices to note that some people preferred pink skin while others preferred white
3. Women resident in urban areas were ranked as the main buyers of cassava, as they are less likely to grow it. Purchases by restaurants were also high. Overall, highest sales were recorded in Apac district.
4. Quantity of cassava roots traded varied between seasons. For example, on Apac, trade was highest during festive and/or wet seasons. On the contrary, sales were low during planting seasons owing availability of alternative staple crops e.g. matooke.
5. Local variety "*Nyaraboke*" was of high priority in Kampala and Luweero regions, but given second priority in Apac, as "*Bao*" ranked first. In Luwero, local varieties "*Gwaranda*" and "*Kisiita*" were ranked second and third respectively in Kampala region, while officially released variety "*NASE 14*" and local variety "*Mwanje*" were ranked second and third in Luweero region. It is noteworthy that varieties common to the three regions included "NASE 14" and "Nyaraboke" while "Bukalasa" and "NASE 13" were common to Kampala and Luweero regions.
6. Transportation, exposure to sunshine and poor handling were reasons given for spoilage. To avoid this, Kampala region traders have opted to transport cassava at night. Covering roots with sweet potato vines, papyrus, and cassava leaves is purported to avoid spoilage in the market.

1 INTRODUCTION

This report is part of the RTBfoods project, Work Package (WP) 1. The main objective of RTBfoods is to deploy RTB varieties that meet user-preferred quality traits to increase the adoption and impact of improved RTB varieties in sub-Saharan Africa (SSA). To do so, the project is working to (1) Define what are the key user-preferred quality traits for a range of RTB food products (cassava, yam, potato, sweet potato, banana) through surveys with end-users (product profiles); (2) Link these product profiles with biophysical and functional properties of RTB food products, and develop laboratory-based methods to assess these properties in a quantitative manner; (3) Develop high-throughput phenotyping protocols (HTPP) for rapid screening of user-preferred quality traits in new RTB varieties; (4) Integrate key user traits into breeding and variety deployment programs.

WP1 provides the evidence base for users' preferred characteristics for the selected products that are the focus of the RTBfoods project. Varietal preferences start with the demand from a range of users, such as producers, processors, retailers and consumers along the food chain. Users' varietal choices are informed by the preferences they have for certain characteristics of the crop (characteristics preferred) that can be linked to traits. Preferences for characteristics, are in turn, influenced by the products, and their variations, that users make (e.g. matoke in Uganda, gari, fufu or pounded yam in Nigeria), and for what purpose (e.g. urban or rural markets, household consumption). Users often have several specific characteristics that they prefer and/or have 'non-negotiable' sets of characteristics, such as, for producers, that the crop is high yielding or disease resistant. These different interests culminate into trait packages that can help explain the drivers of varietal acceptance.

Sometimes there are clear differences in the characteristics preferred by user groups that follow product/consumption profiles, but other times it is more complex. Different users of a crop may live in the same household, have different interests with how the crop is used and what products are made. This can result in multiple and, perhaps, contrasting preferences that vary according to the user's role in the food chain, meaning that the input and decision-making roles of different users is of primary importance in RTB crop breeding.

Preferences for certain product characteristics stem from broader socio-economic and gender dynamics, which are in turn an integral part of understanding crop choice and use. Men, women, boys and girls play different roles in RTB food chains, and differ in their access to, perceptions of risk for, and ability to decide on use of improved varieties. For example, gender roles regarding household food security and marketing can mean that one gender may prioritise crop or product storability characteristics (in ground or after harvest) over yield characteristics. In addition, in locations with shared farming systems between men and women, such as in Uganda, one household member may have more decision-making authority on cropping decisions than others. Different varietal characteristics can also influence the level of labour and exertion involved in processing. In addition, consumers have their own sets of sensory preferences linked to different varieties, and consumers may have different preferences based on their background, gender, location or food culture. Therefore, characteristics that respond to multiple-use and multiple-user groups (such as yield and disease resistance), or differentiating segments of use, including men and women in all their diversity, are an important factor in breeding initiatives.

However, there is a gap in knowledge of preferences for RTB crops among different user groups, particularly food processors, retailers and consumers, and diversity within user groups (e.g. producers can have different size of landholding, access to extension etc.), as breeding programmes have historically focused on production related characteristics at the expense of post-harvest and consumer preferences. In addition, information on characteristics is often overly-simplified by not including information on the optimal range or description that would help breeders be able to meet user needs. Furthermore, there is little known about how gender relations and norms influence and result in preferred characteristics, along with varietal uses. WP1 aims to address these gaps in knowledge under the RTBfoods project, which will contribute to shaping crop breeding to be more responsive to user needs along the food chain.

The WP1 approach uses interdisciplinary methods and lines of inquiry (food science, gender and economics) to collect evidence on the preferences of RTB product characteristics for different user

groups in the product chain and identify the factors that influence these preferences for men, women and other social segments, and how they may be prioritised differently (e.g. labour requirements and storability may be prioritised more for women, over yield characteristics). The delivery of the information is expected to support the capacity of RTB breeding programmes to be more demand-led. The approach has the following activities:

- Activity 1: State of Knowledge review
- Activity 2: Capacity strengthening and sharing
- **Step 2: Gendered product mapping**
- Step 3: Community-based RTB Food processing/preparation diagnosis
- Step 4: Consumer taste tests in rural and urban market segments

This report presents the findings for Step 2, Gendered product mapping.

The objectives of Step 2, are to:

- Understand who is producing, processing, selling and consuming the crop and product, from a gendered perspective.
- Understand the multiple uses and products of the crop and possible trade-offs between uses
- Identify the quality characteristics and descriptors by stakeholder group (e.g. producers, processors) and demand segment (e.g. rural consumers).
- Understand how gender influences preferences and prioritisation for characteristics.

This activity focuses on both the crop (cassava) and product (boiled cassava), to identify the quality characteristics along the food chain (production, post-harvest and market) by different stakeholders, the multiple uses and trade-offs between uses, that may reflect different interests of men and women.

2 METHODOLOGY

There are four activities under Step 2 that take place in eight rural communities where people grow, process and consume the cassava. These are:

- Key informant group interviews (KII) with community leadership.
- Individual interviews (II) with community members who process the product (and produce the crop, if possible) in the community, conducted by a food scientist and gender specialist. The IIs provides individual/household level description of preferred characteristics and priorities at different stages of product processing, household decision making, and trade-offs.
- Sex-disaggregated Focus Group Discussions (FGD) with people who produce, process and consume the product. The FGDs specifically provide information on products, gender roles and social segments, processing steps and equipment, characteristics and descriptors that can be probed in further in IIs.
- Market Interviews (MI) with key individuals or groups involved in marketing and trading activities.

Step 2 was conducted in Luweero district (Central Uganda) and Apac district (Northern Uganda). Both areas are known for production and consumption of the boiled cassava product (UBOS, 2010). In Apac district, cassava is a major staple food crop of the people and an intricate part of their socio-econimic life. Boiled cassava in this region is consumed for lunch and dinner, school children pack the balance of dinner for school breakfast while the adults consume copious amounts of the cassava derived potent gin moga moga as they dance away to African tunes to kill the evening boredom. The area is also famous for trade in other cassava products like dried chips.

In Luweero, there are ethnically mixed communities some of which heavily depend on cassava for food. Given the close proximity of Luweero to the capital Kampala, farmers have some access to urban markets that tend to offer better prices for cassava compared to local markets. Therefore, the

area produces significant quantities of the crop. Figure 1. Shows the study areas on the Map of Uganda. The break down on the locations, sampling and duration of the study is presented in Table 1.

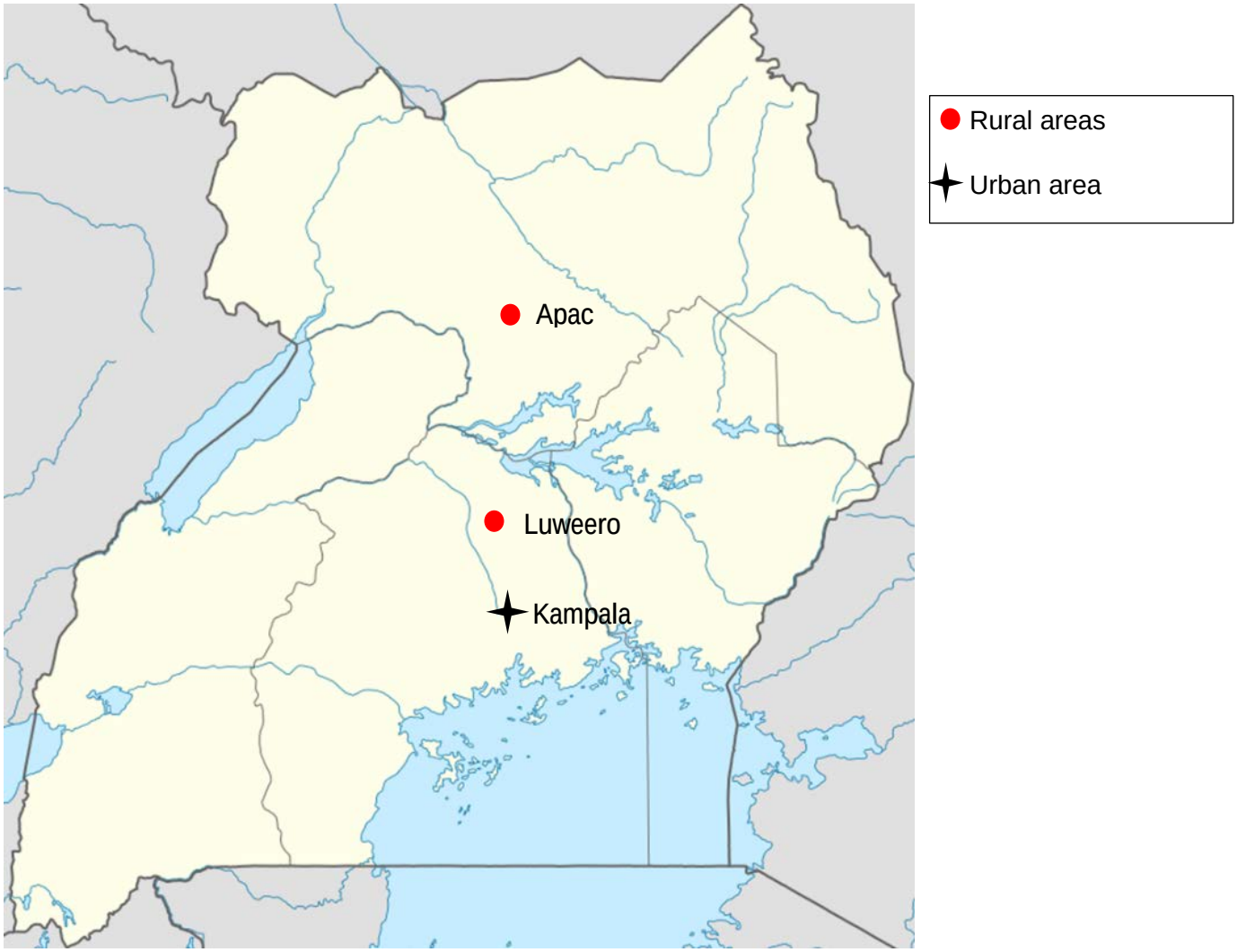

Figure 1. Map of Uganda showing the geographical locations where Step 2 was conducted

Table 1. WP1 Sample for Steps 2, 3 & 4 on Boiled Cassava (Uganda)

Activities reported in Period 1 on Boiled Cassava in Uganda			*Dates of Field Surveys*		*Regions surveyed*	*List of Localities: Cities Small Towns Villages*	*Nb of Individual Interviews*		*Nb of Focus groups*	*Questionnaires uploaded on RTBfoods platform*	
			Start	*end*			*M*	*F*		*Yes*	*No*
Step 2	*Primary Country*	*Uganda*	26 September 2018	6 October 2018	APAC (Northern Uganda)	ATANA	6	5	2	Y	
						AKERE	4	5	2	Y	
						CHEGERE	4	5	2	Y	
						ATIGOLWOK	6	4	2	Y	
			08 October 2018	18 October 2018	LUWEERO (Central Uganda)	BUKAMBAGA	2	5	2	Y	
						BWAZIBA	5	5	2	Y	
						KABAKEDI	5	8	2	Y	
						KAKINZI	5	5	2	Y	
Activities performed in Period 2 on Boiled Cassava in Uganda			*Dates of Field Surveys*		*Regions surveyed*	*List of Localities: Cities Small Towns Villages*	*Nb of Individual Interviews*		*Nb of Focus groups*	*Questionnaires uploaded on RTBfoods platform*	
			Start	*end*			*M*	*F*		*Yes*	*No*
Step 3	*Primary Country*	*Uganda*	21st May 2019	3rd June 2019	Apac	ATANA, Ayegero village		5	0		No
						AKERE, Ogei village		5	0		No
						CHEGERE, Anyambazi.B		5	0		No
			11th June 2019	22nd June 2019	Luwero	Butuntumula, Ngogolo town		5	0		No
						BWAZIBA, kiberenge Village		5	0		No
Step 4	*Primary Country*	*Uganda*	21st May 2019	3rd June 2019	Apac	ATANA, Ayegero village	9	26		Y	
						AKERE,Ogei village	9	11		Y	
						CHEGERE, Anyambazi	15	26		Y	
			11th June 2019	22nd June 2019		Butuntumula,Ngogolo town	18	29		Y	
					Luwero	BWAZIBA,kiberenge Village	21	21		Y	
			27th June	5th July	Kampala City	Nakawa Market	13	2		Y	
						Kalerwe Market	12	15		Y	
						Kasubi Market	17	22		Y	
						Gayaza Market	13	2		Y	

3 FINDINGS: SOCIO-ECONOMIC CONTEXT AND PRODUCT PREFERENCES

3.1 Social segmentation and livelihoods

Communities were grouped by key informants along tribal and wealth categories. Apac is located in the Lango sub-region of Northern Uganda. The community is more or less ethnically homogeneous with very few other tribes co-existing with them. In fact, it's only in Okele parish where the Balalo were reported to have settled, comprising of about 2% of the population. The Balalo are a group of nomadic pastrolists originating from Western Uganda. Traditionally, the Langi people are crop cultivators, with some households keeping livestock. The Langi typically define wealth along agricultural lines. Thus, we have the rich (wealthy) farmers, we have the middle class and the poor farmers. When categorising wealth, crop cultivators will typically consider the acreage of crop while livestock keepers will consider heads of cattle kept. In Luwero, Baganda are the majority ethnic group. However, other ethnicities like the Banyarwanda and Alurs are also conspicuous. Unlike Apac residents, occupants of Luweero have several indicators for wealth including: land ownership, access to land (ability to hire land for farming), ability to hire labour, nature of residential house (permanent, semi-parmenent, temporary/mud and wattle), number of livestock kept, type of livestock kept (cattle, goats, pigs and chicken) and mode of transport commonly used (car, motor cycle, bicycle) among others. Table 2 shows the breakdown of the communities by age group and wealth status according to key informants.

Table 2: Social segments (KII Q2)

Community name	Social segments (%)
Atama parish, Apac	Ethnicity: Langi (100%) Age group: children < 18 years (30%), youth aged 18-45 years (60%), adults older than 45 years (10%)
Akaro Parish, Apac	Age group: children (40%), youth (35%), adult men (15%), adult women (20%),
Awir, Apac	Wealth: Poor (10%), moderate (50%), wealthy (40%) Age group: children (10%), youth (50%), adult men (20%), adult women (20%)
Chegere, Apac	Wealth: Poor (10%), moderate (70%), wealthy (20%) Age group: children (10%), youth (40%), adult men (20%), adult women (30%)
Chegere,k Apac	Wealth: Poor (32%), moderate (48%), wealthy (20%) Age group: children (20%), youth (19%), adult men (23%), adult women (38%)
Bwaziba, Luwero	Wealth: Poor (30%), moderate (60%), wealthy (10%) Age group: children (20%), youth (30%), adult men (20%), adult women (30%)
Luwero	Wealth: Poor (10%), moderate (60%), wealthy (30%) Age group: children (25%), youth (20%), adult men (15%), adult women (30%)
Kakinzi mulima village, Luwero	Wealth: Poor (70%), moderate (30%), wealthy (10%) Age group: children (30%), youth (30%), adult men (10%), adult women (30%)

Livelihood activities of people in the community involving food crops

Information of activities of people in the community which involve food crops is presented in Table 3. Crop farming was the most common activity for both men and women in both regions. It is done to meet the household needs especially school fees and hospital bills". The common crops grown include; soybeans, maize, sunflower, beans, cotton, ground nuts, sorghum. Sesame was reported to be a woman's crop in Apac as evidenced in this quote "in the garden simsim is for both the husband and wife but in the store it is for women. Women control the proceeds from simsim". In Luwero, women reported that they mostly grew annual food crops as they had limited access to land and also had to cultivate food for the family as evidenced in the quote; "Women mostly grow cassava, maize and beans to get money", "Men mostly grow maize and coffee. Men have land as such can grow perennial crops like coffee. They don't cook so they only grow crops for sale".

However, farmers from both regions had other economic activities which suplemented their household incomes. In some instances, there were gender based differences in the additional economic activities. In Apac, men participated in activities like charcoal burning, carpentry, sand mining and brick laying. Sand mining and brick laying are done by youthful males becuase they are labour intensive. On the other hand, women were engaged in brewing the potent gin moga-moga, operating small retail shops and baking pancakes. In this community, both men and women participated in fishing. However, the mode and purpose of fishing differed for men and women as evidenced this quote ; "whereas men fish in deep waters and take their catch to the market, women mostly fish in the shallow waters or during the dry season for mad fish" (mad fish is a type of fish). The catch made by women is mostly consumed at home as source. In Luweero, there were also gender based differences in additional economic activities. Riding cargo or passenger motor cycles (boda bodas) is a preserve of men. Carpentry and working at construction sites were also considered to be jobs for men. Both men and women were engaged in retail and produce trade, brick laying and stone quarrying.

Table 3. Livelihood activities of people involving food crops

Male/female FGD + Community name	Livelihood activities and people they are important for
Women's FGD 1, Apac	Crop cultivation, animal rearing, retail trade, alcohol brewing and produce trade. "Both men and women are involved in farming. Brewing moga moga is by women, pancakes are made by women while men do produce trade."
Women's FGD 2, Apac	Farming –crop cultivation and animal rearing- (men and women), retail trade – pancakes- (women), produce trade (men), brewing (women),
Women's FGD 3, Apac	Cultivation of cassava and selling of cassava cuttings and tubers. Selling of pancakes while others sell ground nuts ans sim sim.
Women's FGD 4, Apac	Cultivation of crops and raring of livestock. Selling of pancakes made from cassava on retail, brewing of alcohol made from cassava called "*moga moga*" and selling of other crops they grow.
Men's FGD 1, Apac	Farming –crop cultivation and animal rearing- (men and women), carpentry (men) "For me, I supplement my farming with carpentry"
Men's FGD 2, Apac	Farming (all), bricklaying (youths, men and women), agro-forestry (men) charcoal burning (men and women), brewing potent gin (women), fishing (men and women) *"However, whereas men fish in deep waters and take their catch to the market, women mostly fish in the shallow waters or during the dry season for mad fish."*
Men's FGD 3, Apac	Farming (all), trading-selling pancakes, boiled cassava (women)
Men's FGD 4, Apac	Growing of crops such as maize, sunflower, beans, cotton, sim sim (majorly grown by women.
Women's FGD 1, Luwero	Farming-crops like sweet potatoes, maize, beans, cassava, coffee and rearing animals like goats, pigs and cows- (men and women) *"Women mainly concentrate on food crops like sweet potato, beans, cassava and maize. Men mainly grow coffee and maize."* *"but normally, women own goats and pigs while most men own cows."*

Male/female FGD + Community name	Livelihood activities and people they are important for
Women's FGD 2, Luwero	Crop farming -maize, cassava, beans, peanuts- (men and women), trading-cassava chips
Women's FGD 3, Luwero	Crop farming-cassava- (men and women)
Women's FGD 4, Luwero	Farming-crops like cassava, maize, beans, potatoes, coffee, and rearing animals like pigs and cows- (men and women) *"Women mostly grow cassava, maize and beans to get money"* *"Men mostly grow maize and coffee. Men have land as such can grow perennial crops like coffee. They don't cook so they only grow crops for sell "*
Men's FGD 1, Luwero	Farming-crop farming and animal rearing-, stone quarrying, brick laying, Boda boda riding, produce trade, retailing shops, construction/building
Men's FGD 2, Luwero	Farming-crop cultivation and animal rearing, brick laying, produce trade, retail trade
Men's FGD 3, Liuwero	Farming –crop cultivation and animal rearing (men and women), retail trade (men), produce trade –beans- (men), casual labor (men, women, poor, and very poor)
Men's FGD 4, Luwero	Farming, produce trade, herbal medicine

Segmentation of the community in terms of wealth categories

Results on community wealth categories according to focus group dicsussions are presented in Table 4. For both Luwero and Apac, people were categorised as rich, middle class or poor. However, some communities in Luwero reported that there were a class of people they considered to be at the extremes of poverty. These were said to be very poor. Generally, the participants in both Luwero and Apac used the same parameters to categorise their communities by wealth. These included ; 1) size of land owned or access to land 2) nature of the residential house in terms of size and furnishings [temporary (grass thatched, mud and wattle), semi-parmanent (un-baked bricks with grass or iron sheet roofing or mud and wattle with grass/iron sheet roofing), permanent (baked bricks, corrugated iron sheets or clay tile roofing, floor/wall tiling or fine cement fininshing, perimeter wall, source of lighting/heating)] 3) type and number of livestock, 4) possession of means of transport, and 5) nature of schools children attend.

Results from both regions revealed that the wealthy in all communities were the minority. Participants from Apac district stratified their community into three wealth categories; the rich, the middle class and the poor. However, participants from Luwero mainly had four categories; the rich, the middle class, the poor and the very poor. These participants further articulated that the very poor people had no land, they lived in rented houses, had no food security and their children either attended UPE schools or did not go to school at all. UPE schools are generally regarded to be of the lowest grade/quality, attended by children whose parents are too poor to afford even the inexpensiveprivately run primary schools in their neighbourhoods. In some communities, the very poor were said to produce many children in addition to being lazy. The poor, on the other hand, were described as mainly women headed households that had limited access to land (cultivate under one acre) and were said to be food insecure, live in traditional houses (temporary mud and wattle structures) and have no means of transport. Besides this, most people under this category do causual work to earn a living and their children only go to government run schools (UPE) in their neighborhood and keep a few goats, chicken or pigs. They mostly cultivate annual crops under mixed cropping systems to maximise diversity of food options.

Members of the middle class from Luwero were said to have permanent houses roofed with iron sheets. Those from Apac district, where roofing with grass is a tradition were said to have at least more than two good looking grass thatched houses (also called dyeri dyeri) in a homestead. They have more than two acres of land for cultivation and normally hire labour to help them in their gardens especially during planting, weeding and harvesting, their children go to rural private schools that offer better quality of education, they own at least either a bicycle or motorcycle and they are food secure. They also keep at least five heads of cattle. They may hire additional land to grow crops for sale. In Apac where ox-ploughing is common, one in this class of society is expected to own an ox drawn plough and a pair of oxen.

Lastly, in Apac the rich were described as people with more than 20 acres of land. These reside in permanent well-furnished homesteads, keep many heads of cattle and generally send their children to good quality privately run schools in town. Their children were said to have chance to study up to university. In Luwero, some one with more than 10 areas of land was said to be rich. They use mechanisation especially using tractors. They have permanent houses with Iron roof and own motorcycles, bicyles or cars. ‘‘The rich men in this village dont marry many women and they always have piece at their home, they have respect for their wivies unlike the poor men who always fight,’’ this was quoted from one of the female FGD in Luwero district. The rich people take their children to Kampala or town private schools which are expensive. They have televisions, solar systems or houses connected to national electricity grid, own large retail or whole sale businesses. Their houses are usually were furnished, may be with perimeter fencing, keep more than 20 heads of cattle. Coffee is a major cash crop in Central Uganda but in Luwero, its cultivation is considered a preserve for the rich for have access and control over large chucks of arable farm land.

On average, 30% of the people are perceived as rich (large scale/commercial), half (50%) belong to the middle class (moderate scale farmers) while 20% are perceived as being poor (small scale farmers/Peasants). Cassava, maize, beans are major cash crops. Women grow cassava and beans for food and soybean, ground nuts, soy bean and sorghum for income. Men grow cotton, maize and coffee for income. In Apac, the KIIs were consistent with the descriptions offered by the community in terms of wealth categorization. In Luwero however, there seemed to be a difference. Whereas the KIIs defined the rich (abagaga), the middle class (abowakati) and the poor (abaavu), some communities reported that there were those who lived under extreme poverty; the very poor (abaavu nnyo). These were the less fortunate members of society, homeless people who mostly survived from hand to mouth by offering casual labour on farms.

Table 4. Segmentation of communities by wealth category

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Women’s FGD 1, Apac	Wealthy/rich (20%): A very nice house of a permanent structure with good iron sheets. Owns about 20 acres of land. Has plots of land in town. Have a farm of cross-bred cows. Has a car. Children are in very good schools. Man and wife work together Moderate (30%): Semi-permanent house. 3 to 4 acres of land. 1 to 3 cows. Have a motor cycle. Children are in any primary school around the village; or UPE. Poor (50%): Have no land completely hence they are squatters on other peoples’ land. Family not food secure. The men over drink while women go to work. Children don’t go to school; hence illiterate.
Women’s FGD 2, Apac	Wealthy (10%): A very good house. Own about 14 to 20 acres of land. Have a farm of about 10 to 50 cows of very good breeds. The household is food secure. Children are in very good schools. Moderate (30%): Fair house. Own 5 acres of land. Own 2 to 3 cows. Children go to not very good schools. They have food. Poor (20%): Semi-permanent house with no windows. Own at least one and half acres of land. Have no cows but about 2 goats. Family food insecure. Children often drop out of school. Very poor (40%): Have grass thatched houses. Have no land. Children don’t go to school. They drink alcohol. Men are lazy and don’t want to go to work

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Women's FGD 3, Apac	Wealtht have large piece of land about 20.acres, use tractor to phlough, have permanent house (iron roof and bricks) and own a motor cycle and/or car Middle class own an ox plough, can hire an a tractor once in a while. Have more than one grass thatched house or permanent house (iron roof and bricks) and own an bicycle Poor class are usually woman headed households with no childred, have 1 acre of land, 1 grass thatched house and walk on foot. Very poor class have no house, land and basic life requirements
Women's FGD 4, Apac	Wealthy are about 25%. They are married, their children are educated up to high level of education like secondary or university. Have permanent house made of bricks and iron roof. They have 10> cattle, 30> chicken, a motor cycle or vehicle and a bicycle to fetch water and/or fire wood. Middle class are 65%. They have 3 grass thatched houses, 2 goats, 3 chicken, 3-5 acres of land are married, have a garden of cassava so are somewhat food secure. Their children have low level of education up to primary. Poor class are 10%. They have one grass thatched house, 0.5-1 acre of land, no cattle, goats or chicken. They are food insecure and are not married.
Men's FGD 1, Apac	Rich (30%): Owns iron sheet roofed house, >10 acres of land, >20 animals, food secure "*can afford 3 meals a day"*, children are in boarding schools Moderate (20%): Live in semi-permanent house. Own about 5 acres of land, a pair of oxen and an ox plough. Poor (50%): have no proper house, no land, feed from hand to mouth
Men's FGD 2, Apac	Rich [*olonyo/alanyo]* (20%): Owns a permanent house with corrugated iron sheet roofing. Owns >20 acres of land and >120 head of cattle. Own at least one vehicle, have a big retail or wholesale shop, their children reach higher levels of learning and may study abroad. They bank large sums of money. Middle class [*dyeri dyeri]* (30%): have 4-5 grass thatched houses in their homestead, own < 100 cows and 5-10 acres of land, use oxen to plough, and their children go to school Poor (50%): Own 1 grass thatched house in their homestead, own 1-2 acres of land, offer labour for food or money, no known source of income, have many children, dig using hand hoes
Men's FGD 3, Apac	Wealthy/rich (10%): Own more than 10 acres of land, men and women farm on separate plots, use tractors, hire labor, have constant access to planting materials Medium (30%): Own 2-9 acres of land, farm on separate plots, hire labour, children go to private school Poor (60%): Owns less than 1 acre of land, small scale farming, do not hire labour or land, farm on shared plots, intercrop
Men's FGD 4, Apac	Wealthy class own over 10 cattle and goats. Possess an iron roofed house mad with bricks. They own 1-2 dairy cattle, car or motor cycle and can hire transportation, educate children upto university. They practice monocroping of maize, sunflower, cassava on large scale. Modorate class has 3-4 acres of land, hire land for personal use, own 2 goats, 1-2 oxen and are married. They leave in a 2-3 roomed iron roofed house made with bricks, owns motor cycle or bicycle. They mostly practice intercropping. Poor class have one grass thatched house, 1-2 acres of land, are married and rent land to grow crops but uses profit to drink alcohol. They usually move by foot. The destitute class are not married, given basic needs by good Samaritans, take over abandoned buildings, sell their labour to the wealthy for cash, move by foot and the don't cultivate to get food
Women's FGD 1, Luwero	Wealthy have 10> acres of land, 20> cows, houses to rent=10> rooms, whole sale shop, car or motor bike and are married. Their children study up to university Middle class own 5< acres of land, have 1 cow, have houses for rent (6-5 rooms to rent), own a retail shop, motor bike and are married. Their children study up to senior six. Poor class 2 acres own 1 goat, a bicycle are married and their children study up to primary seven or senior one

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Women's FGD 2, Luwero	Wealthy are about 25%, have a permanent house (made of bricks and iron roof) with a big solar system, own land with a title- 5 acres and above. They have upto 30 cows. Middle class are about 35%, own 2 acres of land, 1-2 cows and have a permanent house Poor class are about 40%, has no cows, have a plot of land or ½ acre of land. Own a simple house with one side roof (kyuyi kimu) without plaster.
Women's FGD 3, Luwero	NR
Women's FGD 4, Luwero	NR
Men's FGD 1, Luwero	Rich (10%): well constructed house with tiles, water tanks, well furnished house, and powered by hydro-electricity or solar power, own at least 100 heads of cattle, own at least 30 acres of land, own a car and their children attend first class boarding schools Middle class (20%): Well furnished cemented house with water tanks and powered by hydro-electricity or solar, own 5-10 cows, 3-10 acres of land, either a car or motorcycle, and their children may attend boarding schools Poor (30%): Have small corrugated iron sheet roofed houses, own 1 goat and at least 10 free range chickens, own a bicycle, plot of land, and have many children attending private schools around the parish Very poor (40%): Grass thatched house, rent premises and pay in kind, own no means of transport and their children attend Universal Primary Education (UPE) schools
Men's FGD 2, Luwero	Rich (20%): Have a permanent well-furnished house, own 2 cows, have about 2-3 acres of land, own a motorcycle, men have wives and children, children attend private schools in the community Middle class (30%): Live in a mud house roofed with iron sheets, own 2-3 goats and 4 chickens, have a small plot of land, own a bicycle for fetching water, and their children attend UPE schools Poor (50%): Their homes are located in the most remote parts of the community, live in grass thatched houses, own 1 pig, have no land on which to farm, are mostly casual labourers, cannot afford necessities including medical bills
Men's FGD 3, Luwero	Rich [*abagaga]* (10%): Their homes are well furnished and fenced residential houses with iron sheet roofing and electric power, they also own houses for rent, own more than 30 heads of cattle, and more than 8 acres of land, own the newest cars, and their children go to first class boarding schools Middle class [*abawakati]* (30%): Have moderate residential houses with iron sheet roofing and electric power, own 10 goats and 4-6 cows and 3 plots of land, their children go to middle class schools Poor [*abaavu]* (40%): Have small houses of single side entrance with iron sheet roofing, own 1-2 goats, rent land for farming, own a bicycle but sometimes hire a motorcycle, engaged in small businesses like mobile money, selling solar panels, children attend cheap schools Very poor *abaavu enyo* (20%): Live in grass thatched house, rent houses, own no land, are casual laborers, children attend UPE schools
Men's FGD 4, Luwero	Rich (10%): Well furnished house with electricity, own >40 cows, > 10 acres of land, have multiple jobs, employ others, can afford household expenses such as medical expenses, children go to first class schools Middle class (40%): Their houses look good but are small, own 5-6 acres of land, own motorcycle, can afford household expenses including medical expenses, food, and animal feed, hire a few labourers and their children go to good schools Poor (30%): own about 5 pigs, 1-2 acres of land but hire 1-3 acres of farm land, own a bicycle, do not store enough food, have many children who go to cheap private schools but have low attendance as fees are paid late Very poor (20%): live in rented houses, have no animals, no land, are casual labourers, intercrop on small plots of land, food insecure, children are always absent from school as they cannot afford the fees

3.2 Farming practices and social segmentation

3.2.1 Farming practices and social segmentation

Men and women in both regions were engaged in both mono cropping and intercropping, as shown in Table 5. However, mono cropping was among other factors linked to the size of land available to the household. Those with big pieces of land are more likely to mono crop compared to those with small pieces. Men are also more likely to than women to practise mono cropping because "they target the market"; "have higher requirement for money to cater for home needs". It is a general perception that mono-cropping systems yield higher than intercrops. Women on the other hand are prone to intercropping because in addition to having limited access to land, they have to grow crops like beans or groundnuts. In Luwero, the decision to intercrop or mono crop was also driven by the season; "when cassava is planted in November or December, it is mono cropped because other crops cannot withstand the dry spell of December-February. In case it is planted during planting season/ March, it is intercropped with beans because of the rainy season'. Others simply intercropped for food security; 'If you have cassava only for food, you may have no food in the household since it has a long maturity period. At least if you also put maize you will have some food.

Table 5. Farming practices of men and women

Male/female FGD + Community name	Farming practice (Q3.1a)	Sex
Women's FGD 1, Apac	Intercropping with maize, soy bean, millet	Women
	Planting in rows	
Women's FGD 2, Apac	Intercropping with beans, maize, soybean, peas	Men and women
	Planting in rows	Men and women
	Seasonal planting in March	Men and women
	Harvesting	Men and women
Women's FGD 3, Apac	Intercropping cassava with maize	Men
	Intecropping with beans	Women
Women's FGD 4, Apac	Intercrop with soy bean, maize and ground nuts.	Men and women
	Plant in holes not ridges	Men and women
	Mono cropping	Bachelors and youth boys
Men's FGD 1, Apac	Intercropping	Women
	Monocropping	Men and women
Men's FGD 2, Apac	Intercropping	Poor and middle class
	Monocropping	Men and women
	Planting in rows	Men and women
Men's FGD 3, Apac	Mono-cropping	Rich men and women *("those with enough land")*
	Intercropping (*"Intercrop cassava with beans and green gram'*)	Men and women
	Planting in rows	Rich men and women
Men's FGD 4, Apac	Intercropping	Women and a few men
	Monocropping	Men and women

Male/female FGD + Community name	Farming practice (Q3.1a)	Sex
Women's FGD 1, Luwero	Intercropping with maize and beans. (*"In case it is planted during planting season/ March, it is intercropped with beans because of the rainy season."*)	
	Monocropping (*"When cassava is planted in November or December, it is mono cropped because other crops cannot withstand the dry spell of December-February."*)	
	Seasonal planting (March/December)	
	Spraying with herbicides	
Women's FGD 2, Luwero	Intercropping with beans, maize, peanuts	Men and women with limited land
	monocropping	Men and women with large pieces of land
	Seasonal planting (March, August)	Men and women
Women's FGD 3, Luwero	Intercropping with beans	Women
	Monocropping	Men
	Planting in rows	Men and women
Women's FGD 4, Luwero	Intercropping with beans, maize, peanuts, sweet potatoes	Women
	Monocropping	Men
	Planting in rows	Men and women
	Planting on mounds	Women (if intercropped with sweet potato)
Men's FGD 1, Luwero	Intercropping with maize, beans	Men and women with limited land
	Monocropping	Men and women with large pieces of land
	Planting in rows	
Men's FGD 2, Luwero	Intercropping with maize and beans	Men and women
	Monocropping	Men (*"Have higher requirement for money to cater for home needs"*)
	Planting in rows	
	Seasonal planting (March/August)	
Men's FGD 3, Luwero	Intercropping	Men, women (*"women often intercrop cassava with maize and beans"*)
	Monocropping	Men (*"Men usually monocrop because they target the market"*)
Men's FGD 4, Luwero	Intercropping with maize and beans	Women
	Monocropping	Men
	Planting in rows	Men and women
	Seasonal planting (March and August/September)	Men and women

Household dynamics of management of plots for cultivation

The common practice in the two districts is to have one garden to cultivate that belongsto the family. However, some households seperate the plots. The proportion of communities who practiced combined or seperate farming differed by communities, but overall approximately was 70% combined plots and 30% seperate, according to focus groups discussions (Table 6). "Men and women sometime cultivate on separate plots. Whereas men plant for sale, women plant for home consumption so they must grow crops which they use to prepare stew. Generally, most farm

activities are done together (men and women) apart from harvesting. “We do all activities together but harvesting is mostly done by women. A woman adds “men harvest when women are sick”. It was clear from Chegele that this harvesting role of women was for home consumption “it is women who harvest for home consumption” said a man. However, when harvesting for sale, men will play an active role, not because they want to give a helping hand, but because of mistrust as one male participant from Luwero noted, *“but me as the man, I must know the total harvest because women are unfaithful and can hide some of the bags.”* Another male from Luwero said; *“people usually separate plots because of misunderstandings in the home. If they farm together, they may not agree on how to sell or how to use the proceeds from sales”*.

Difference between men and women’s fields when separate

Differences in women’s and men’s plots according to the focus group discussions are presented in Table 6. Overall, women mostly intercrop because they must grow a sauce crop as a lady from Apac retorted; *“For us if you plant only cassava without beans, what are you going to give the children for sauce”*. Men’s fields were also said to be larger and better managed as noted in the following responses from female respondents; *“Men leave the small piece of land at home for women to manage. Management of the gardens would have been the same but, women mix many crops in the same garden and they don’t follow the recommended spacing because of limited land. Men on the other hand, space their crops better because they grow crops for sale”; “The husband has more money therefore, management is better. For example he (husband) can hire labour for weeding thus the garden is weeded fast and in time.”, “The man can tell the wife and children to weed his field but the man cannot weed for the woman”, [woman, Luwero] “Men invest money in their gardens and have a lot of energy as well” [male, Apac].* Men concured with women that in most cases their gardens looked better as evidenced in the followng quotations ; *“men’s gardens are better than those for women because the women have a lot of work at home’’ [male from Luwero].* However, some men in Luwero argued the appearance of the field may vary depending on the amount of resources at each person’s disposal ; *“It may depend on the amount of money available to a person. If the woman has money, her garden may appear the same as that of the man”*

Table 6. Household dynamics of management of plots for cultivation

Male/female FGD + Community name *	Women's plots	Men's plots
Women's FGD 1, Apac	Shared (100%) Shared work: planting, weeding Women's work: harvesting (*"men don't harvest. Unless if woman is sick then man harvests"*)	Shared (100%) Shared work: planting, weeding
Women's FGD 2, Apac	Separate (70%), shared (30%) Women's plots: practise intercropping (*"For us if you plant only cassava without beans, what are you going to give the children for sauce?"*) shabby (*"men know how to plant. They do row planting but in our gardens, we plant zig-zag"*) Shared work: planting, harvesting, transporting harvest (those with bicycles carry on their bikes for both men and women although some women said they did not know how to ride bicycles.) Women's work : prepare cuttings	Separate (70%), shared (30%) Men's plots: practise monocropping, neat Shared work: planting, harvesting, transporting harvest
Women's FGD 3, Apac	Shared (100%) Women's work: harvest for home consumption	Shared (100%)
Women's FGD 4, Apac	Most house holds own one garden. Infact, phloughing is done together but harvesting is majorly done by women	
Men's FGD 1, Apac	Separate (30%), shared (70%) Women's plots: intercrop Shared work: planting, transporting harvest (*"Women mostly trust their heads so they prefer carrying on their head" "The head is for women, we men use bicycles"*) Women's work: drying (*"drying is mostly done by women because they are ever at home." "Men can easily fly in the evening especially to malwa joints"*)	Separate (30%), shared (70%) Men's plots: neat (*"A man's field is better managed because a man has more energy than a woman."*) Shared work: planting, transporting harvest (*"We do all the work as a unit" "Like for me, I take all my children and wife and we cultivate together"*) Men's work: preparing cuttings
Men's FGD 2, Apac	Shared plots (100%)	Shared plots (100%)
Men's FGD 3, Apac	Separate (25%), shared (75%) Women's plots: shabby (*"men's gardens are better than those for women because the women have a lot of work at home''*) Shared work: planting	Separate (25%), shared (75%) Men's plots: neat Shared work: planting Men's work: selling produce
Men's FGD 4, Apac	Households own one garden and the activities in most crops are shared save those of sim sim which are majorly done by women	
Women's FGD 1, Luwero	Separate plots 70%; Shared plots 30% Women's plots: no difference Shared work: all activities	Separate plots 70%; Shared plots 30% men's plot: no difference Shared work: all activities

Male/female FGD + Community name *	Women's plots	Men's plots
Women's FGD 2, Luwero	Separate plots (60%), shared plots (40%) Women's plots: small, shabby Shared work: all activities	Separate plots (60%), shared plots (40%) Men's plots: neat, big size, hire labour *"The husband has more money therefore, management is better. For example he (husband) can hire labour for weeding thus the garden is weeded fast and in time. "* *"the man can tell the wife and children to weed his field but the man cannot weed for the woman"*
Women's FGD 3, Luwero	Separate plots (90%), shared plots (10%) Women's plots: small, low yields, intercrop Shared work: all activities	Separate plots (90%), shared plots (10%) Men's plots: high yield, monocrop, big size, produce for sale, bigger investment, *"Men invest money in their gardens and have a lot of energy as well."*
Women's FGD 4, Luwero	Separate plots (60%), shared plots (40%) Women's plots: shabby (crowded), intercrop, small, produce for food Shared work: harvesting Women's work: planting, weeding	Separate plots (60%), shared plots (40%) Men's plots: neat, monocrop, big size, produce for sale, hired land *"Men leave the small piece of land at home for women to manage. Management of the gardens would have been the same but, women mix many crops in the same garden and they don't follow the recommended spacing because of limited land. Men on the other hand, space their crops better because they grow crops for sale"* Shared work: harvesting Men's work: tilling *"Those who grow together, men usually hire labour to prepare the land"*
Men's FGD 1, Luwero	Separate (70%) shared plots (30%) Women's plot: small size, practice intercropping, produce for home consumption, neat gardens Shared work: planting, harvesting Women's work: weeding	Separate (70%) shared plots (30%) Men's plot: large size (*"Men often have big gardens because they have enough energy"*), no intercropping, produce for sale Shared work: planting (*"At planting, men dig the holes while women and children drop the planting material"*), harvesting (*"but me as the man, I must know the total harvest because women are unfaithful and can hide some of the bags."*)
Men's FGD 2, Luwero	Separate plots (80%), shared plots (20%) Women's plots: practice intercropping, produce for home consumption Shared work: planting, harvest, post harvest processing Women's work: weeding	Separate plots (80%), shared plots (20%) Men's plots: large size, mono cropping, produce for sale Shared work: planting, harvest, post harvest processing Men's work: slashing, spraying
Men's FGD 3, Luwero	Separate plots (70%), shared plots (30%) Women's plot: use own labor, intercrop	Separate plots (70%), shared plots (30%) Men's plot: hire labor, monocrop, produce for sale

Male/female FGD + Community name *	Women's plots	Men's plots
Men's FGD 4, Luwero	Separate plots (70%), shared plots (30%) Women's plot: no difference (*"It may depend on the amount of money available to a person. If the woman has money, her garden may appear the same as that of the man" "People usually separate plots because of misunderstandings in the home. If they farm together, they may not agree on how to sell or how to use the proceeds from sales"*) Shared work: planting	Shared plots Men's plot: no difference Shared work: planting Men's work: slashing, spraying, transport to market

3.2.2 Important crops in the community

Table 7 shows the most important crops according to focus group discussions in Apac and Luweero disaggregated by gender. Cassava, beans and maize were the most important crops for both men and women as well as the two regions (Apac and Luweero). Results further showed that cassava is an important crop for both men and women in Apac district yet third in Luweero where maize was ranked first followed by beans. In Luwero, sweetpotato was also mentioned by women and men. Similarly, men and women in Luweero mentioned coffee as key cash crop which is generally managed by men sweetpotato is more of a food crop and this could explain the difference in prioritisation between the men and women. Groundnuts and sim sim were identified by women in Apac as important crops. Apac lies within the northern farming system where groundnuts and simsim are important food crops.

Table 7: Important crops in rural communities (FGD 5.1)

Crop importance	Women	Men	Apac	Luweero
1st	Cassava (14)	Cassava (15)	Cassava (21)	Maize (15)
2nd	Beans (14)	Beans (14)	Beans (14)	Beans (14)
3rd	Maize (6)	Maize (14)	Maize (5)	Cassava (8)
4th	Sweet potato (5)	Coffee (3)	Ground nuts (1)	Sweet potato (7)
5th	Coffee (1)	Sweet potato (2)	Sim sim (1)	Coffee (4)

Note: The number is a weight given to the crop

Table 8 shows the reasons why the crops mentioned above are important and for whom they were important for within the respective communities. Cassava was identified as a staple food crop but also a source of income. This is related to the crop's tolerance to stress such as drought. In addition, cassava can be used to produce various products such as flour, pancakes, alcohol etc. In Apac, the men indicated that cassava could be used as a substitute for lime when plastering houses. Cassava was regarded as an important crop for all community members (both men and women). Beans were mentioned as important for food (as main sauce) and income. The FGDs indicated that it was more important for the women because they were responsible for food preparations in the home.

Maize was mentioned primarily as a staple food crop for preparing a *posho* (thick paste commonly consumed by men and women). In addition, maize was also stated to be an income generating crop that requires less labour because it is weeded once and it matures early. Maize is processed into a diversity of products such as flour, roasted, boiled and alcohol. Most FGDs especially in Luweero indiacted that it is an important crop for men since it requires a lot of inputs and has a high market demand. Sweetpotato was mentioned to be a food and income income generating crop. Sweetpotato was mentioned as especially important for the women who grow the crop mainly for food. Coffee was also ranked by men as an important crop since they get income from it to pay school fees and meet other responsibilities in their households.

Table 8: Reasons why the crop is important and for who (FGD 5.2 and 5.3)

Crop	Reasons why the crop is important (FGD 5.2)	People for who the crop is important (FGD 5.3)
Cassava	For food and sale (men's FGD1 Luweero, men's FGD1, 2 Apac; women's FGD1 Apac; women's FGD4 Luweero)	Women (men's FGD1 Luweero; women's FGD4 Luweero). Easy to grow, does not require large capital investment, food for the home All community members (men's FGD1, 2, 3 Apac; all women's FGDs Apac)
	Wide applications for food can be eaten fresh, fried or katogo; mere ewangaala-can be kept as flour; sold for money, it is hardy (drought tolerant) (men's FGD4 Luweero, women's FGD1, 2 Luweero)	Men (men's FGD4 Luweero). For sale
	Major staple, cash crop, used for making moga moga, pancakes, cassava flour is used as a substitute for lime when plastering houses (men's FGD3, 4 Apac)	Men and Women (men's FGD4 Apac; women's FGD1 Luweero). As a source of food and income.
	It is used for home consumption and it is consumed daily Making pancakes, They eat at home and sell in the local market (women's FGD2,3 Apac)	
Beans	Major sauce, sold for money, easy to cultivate (men's FGD1, 3 Luweero, all men's FGD Apac; all women's FGDs Apac)	Women (men's FGD1, 2, 3 Luweero, men's FGD3, Apac; women's FGD3, Apac, women's FGD1, 3, 4 Luweero). They are responsible for preparing sauce at home All community members (men's FGD1, 2, 4 Apac; women's FGD1, 2 Apac)
	Major/universal sauce, cheap, early maturity, easy to store, can even be food in absence of food, sold for money (men's FGD2 Luweero; all women's FGDs Luweero)	
Maize	Major food, for sale, easy to cultivate, Maize is weeded only once so requires less labour ,early maturing, adapted to a wide range of soil conditions (men's FGD1 Luweero; women's FGD 2, 3, 4 Luweero)	Men (All men's FGDs Luweero; women's FGD3 Apac; women's FGD3, 4 Luweero). They grow it for sale, requires a lot of energy to grow, high cost of inputs which women may not afford. All community members (men's FGD1, 2 Apac)
	Most important food as it is easy to prepare, many applications for feed and food as roasted, boiled or posho , porridge, easy to store, for sale (men's FGD2, 3 Luweero) Useful for making the local brew malwa, (men's FGD1, 2, 3 Apac, women's FGD3 Apac)	Both men and women given it's a food and also has market demand (men's FGD3, 4 Apac)
	Quick maturity (3-4) months, wide applications for food = roast, boiled, posho; long storability as grain/flour, sold for income (men's FGD4 Luweero)	
Sweet potato	Easy to cultivate (3 months), resistant to diseases so it is not sprayed, drought tolerant, for sale (men's FGD2 Luweero)	Women (men's FGD2, 4 Luweero, women's FGD1, 3 Luweero). They grow it for food for the home. They have time for planting, weeding. "they are the ones who can bend their backs", they get some little money for savings
	Major cash crop, quick maturity, can be consumed for food but is susceptible to pests (men's FGD4 Luweero, women's FGD1, 3 Luweero)	

Crop	Reasons why the crop is important (FGD 5.2)	People for who the crop is important (FGD 5.3)
Coffee	Major cash crop. "Buli emwanyi bwebala ekitundu kikyuka." Coffee husks are used for mulching, coffee is consumed as a beverage (men's FGD3 Luweero, women's FGD1 Luweero)	Men and the rich (men's FGD3 Luweero, women's FGD1 Luweero). These have access to land.

3.2.3 Cassava

Description of how cassava is grown in rural communities

According to the FGDs, cassava is traditionally intercropped with maize, beans, groundnuts and sweetpotato (Table 9). Planting commences at the onset of the first season rains in March/April and at the start of the second season rains August/September. Harvesting may be continuous (piecemeal) or in bulk in June/July or December/February. However, some KIs noted that cassava planted during the first rains usually does not perform well and therefore farmers usually plant at the onset of the second season rains. The KIIs from Akere parish noted that cassava is rarely planted on virgin land because they believe a disease called ''abang'' causes it to rot if you plant it on virgin land.

According to FGDs and KIIs in Apac district, all (100%) people in the communities grew cassava. Cassava is not only an important (staple) food and cash crop, but also deeply entrenched in the culture of the people. One KII noted that, a young man cannot be allowed to marry a woman if he does not have his own cassava garden. This is purposely done to avoid the young family from starving. However, in Luwero district, cassava is planted as a food security crop which is normally eaten when people have limited food to eat. In Luweero, 60% of the total population grows cassava mainly as cash crop. The demand for fresh cassava roots is high since the district is not very far away from the capital city (Kampala). Cassava is thus an important crop in both central and Northern regions of Uganda.

Furthermore, in Apac district, the elders in the community encourage households to have cassava fields. It suffices to note that there is a variation in the size of land where cassava is grown in Apac and Luweero. For example, in Apac district, cassava is grown on a large scale and its mandatory for families to grow cassava. In Luwero district, cassava is mainly grown on smallscale and the consumption of boiled cassava is a little lower compared to that of Apac

Table 9: Description of how cassava is grown in Apac and Luweero from FGDs

Community	Description of how the crop is grown	Proportion (%) of people in the community who grow the crop	Proportion (%) of the crop that the average household uses for making the product
Chegere Parish, Apac	Cassava is usually intercropped with beans, maize and sorghum. Cassava is planted first and then the crops are inter cropped in between. Cassava is planted and it takes 6-8 months before harvesting starts. It is usually planted in March because this time it is raining. We start harvesting in September to August. The commonest varieties are NASE 14 and NAROCASS1. We rotate cassava with sorghum and peas because when the leaves of these crops fall and rot they revive the soil fertility.	100%	60%

Community	Description of how the crop is grown	Proportion (%) of people in the community who grow the crop	Proportion (%) of the crop that the average household uses for making the product
Apac, Akere parish	Cassava is planted usually in both first and second season. But, usually in April or March. The yield in second (August) season is not usually good. Cassava is usually intercropped with legumes eg. Beans and ground nuts. This is because people find it easy to suppress weeds and benefit. If you plant cassava alone you put in a lot of labour and get less. It helps people to get some harvest in a short time compared to waiting for cassava to mature. Cassava is usually left in the soil and is harvested in piece meal. It is only uprooted when they want to leave the soil to rest. Cassava is usually rotated with simsim, beans and sun flower. It is usually the last in the rotation. We rarely plant cassava in virgin land because we believe that a disease called abang causes it to rot.	100%	43%
Apac, Akare parish	Crops are grown using ox – ploughs for ploughing gardens 2 times before planting, seeds are bought from stockists for other crops then are planted. For the case of cassava cuttings are cut from from his own garden then planted in rows, at a spacing of (1 x 1) metres. He does not intercrop cassava with other crops. He practises crop rotation, Maize = cassava = ground nuts. Planting time is from March –April every year. Harvesting is done from October – December every year after the crop has matured for 18 months. He plants concurrently such that when the other one gets ready he is busy harvesting the mature one. Cassava growing is done in the community for daily consumption.	100%	45% for large scale farmers 70% for small scale farmers
Apac, Awir Parish	Farmers grow crops in groups and others practise individual farming. They intercrop cassava with beans, Groundnuts and maize. Crop rotation is practised in the community. Cassava = Beans = maize. Planting cassava is done seasonally. March – July and second rains August – September. Harvesting time is between November – February.	100%	20%
Atana Parish, Agulu division, Apac municipality, Apac district	Cassava is normally planted in rows intercropped with either beans or maize but maize is said to check the growth of the cassava so beans are preferred for the intercrop. Cassava is planted at the on-set of the rains. Planting is prominently done in March (first season) although a few farmers plant in September (second season). Cassava is grown by all households. The elders in the community try to enforce this for food security. In fact, a youth without a cassava garden is perceived as being irresponsible and cannot be allowed to marry a wife. Cassava is harvested after 12 months of growth. If harvested early, most varieties will be bitter. This bitterness will for most varieties disappear after one year.	100%	80%

Community	Description of how the crop is grown	Proportion (%) of people in the community who grow the crop	Proportion (%) of the crop that the average household uses for making the product
Apac / Chegere/	Most crops are grown without intercropping and they practice crop rotation Maize = cassava = Ground nuts = Simsim = Soybeans Planting 1st rains done in March – April, 2nd rains planting is done in July – August. Harvesting crops is done in June to July and in November to January	100%	Consumption in the community is 30% For female headed households, its 2%
Apac Chegere /Chegere	Crops are generally grown in lines and cassava is intercropped with either beans, groundnuts or maize. She practices crop rotation Beans = Sorghum = cassava = cowpeas seasonally. Planting time for 1st rains is from (March – May) that is cassava, beans and sunflower. 2nd rains from August – October and she plants sunflower, cassava, and maize. Harvesting time for 1st rains is July – August and for 2nd rains is from December – February.	100%	20% for every household The poor category sell everything
Luwero S/County/ Bwaziba Parish	Cassava is grown and intercropped with beans to maximise the use of land which is scarce in the area. They practice crop rotation; Maize/beans = S. potatoes = cassava.	100%	80%
Luweero	Cassava is grown in small scale 1-3 acres due to lack of market and disease occurrence in the area. Most of them intercrop cassava with beans, maize/banana plantation. Few model farmers practice crop rotation. Beans = maize = cassava = Sweet potatoes. Planting time 1st rains March – May, 2nd rains August – October, Harvesting time	100%	20%
Luwero/ Kakinzi Mulima Village	Cassava is grown with other crops and is intercropped with maize, beans, groundnuts. Cassava/beans = Sweet potatoes = maize. Average acreage of crops grown range from 0.25 – 0.5 acres. Planting season, 1st rains is from March to May, 2nd rains is from August to October, Harvesting time 1st rains is from June to July, for 2nd rains, harvesting is from December to February	100%	95%

3.3 Varieties of the crop and planting material

The most common varieties from the two regions were Nase 14, TME14 and Narocass1 (Table 10). However, in Apac district, Bao was commonly mentioned by all the respondents including FGDs, KII and Individual Interviews. Bao is generally the most preferred local variety from the north and was liked by most farmers due to its quality attributes highlighted in the next sectio. In the two sub-counties surveyed, Bao was commonly grown in Apac subcounty in Akere and Atana parishes while in Chegere sub-county, farmers were business oriented and they preferred mainly with the two released varieties on market purposely to get money from the stem cuttings since they were on high demand by the south Sudan government at that time. However, when they where further probed to find out if they really liked the released varieties for food, they mentioned that in most cases, these released varieties were bitter especially during dry season which was not the case with Bao. However, Bao had no market for the cuttings yet they needed money to pay school fees and buy other sfuff for home consumption.

Cassava varieties grown in Apac and Luweero based on FGDs in their communities are summarised in Table 11. Overall, for both sexes and regions, local landraces appeared to be preferred due to their attributes highlighted by farmers. In Apac district, Bao a local variety ranked very high in all sub-counties. Farmers emphasised that this variety was:

“Tolerant to diseases compared to other local varieties, it is not bitter, cooks fast and soft, produces white boiled cassava/food, it has big tubers”. “Its texture/composition/physiology does not change even if it is raining or it is during drought” unlike the improved varieties’’. “Above all, the roots are not fibrous and its flour has good starch which can enable us to use the flour for plastering our houses hence saving money”. Both men and women’s FGDs selected Bao, a landrace as the most preferred variety grown in their communities. Both men and women’s top three varieties also included the released variety NASE 14 (ranked second by women and third by men). This was introduced about five years ago in these communities.

However, in Luwero, Nankinga/ TME 14 was ranked the most preferred variety to grow, which is an improved variety that farmers have been planting it for over a decade. In addition, the men preferred Nankinga whereas the women ranked the improved NAROCASS1 among their most preferred varieties (Table 11). Women noted that this variety was “commonly used for making local brew because it produces bitter roots”. A woman narrates “It (Narocass1) produces very strong local brew which has a nice aroma”. “The variety is high yielding” and the stems have a ready market. NAROCASS1 is a relatively new variety, having been released in 2015. NAROCASS1’s impressive yield and ability to yield premium quality brew is likely to endear it to the farmers given that the cassava derived potent gin moga moga/lira lira is part and percel of the social fabric of Apac. Another local variety (Buyuki) was the only other variety in common between men and women FGDs in Luwero.

In terms of region, varieties preferred by Apac were distinctly different from those preferred by Luweero. All preferred varieties in Luweero were given local names sometimes depending on the persons who introduced the variety to the community or depending on the place where initial planting material was collected. Thus they were given names races (Nankinga, Buyuki/Caritus/Nase14, Njule, Mawejja, and Kazza). For example, the commercial variety NASE14 is also called Buyuki (a place) and Caritas (an NGO). The varieties preferred in Apac consisted of both local and released (Bao, NASE 14, NAROCASS1). However, considering FGDs by sub-counties, it was noticed that in Apac sub-county (Atana and Akere parish), that farmers did not like improved varieties claiming that they are bitter and hard while in the second Sub-county of the same district (Chegere sub-county) they ranked Nase 14 and NAROCASS1 as their best varieties because they were both early maturing and high yielding. They further narrated that these improved varieties had a market for the stems/ plating materials and therefore made a lot of money which was not the case with the local varieties. Farmers in Chegere also said that NAROCASS1 makes the best ‘’Mogamoga’’ which is a local brew made from cassava.

In a nutshell: Narocass1 and Nase 14 were purposely grown in the north for business. That is to say, they are very good for making local brew (Moga moga) due to their bitterness and Nase 14 produces more brew compared to other varieties. These two varieties were both reported to be early maturing.

Table 10. Varieties grown in order of importance (II Q15.1)

Importance	Women	Men	Apac	Luwero
1	Nase 14 (I)	Nase 14 (I)	Bao (L)	Nase 14 (I)
2	Bao (L)	Bao (L)	Nase 14 (I)	TME 14 / Nankinga(I)
3	Narocass 1 (I),	Narocass 1 (I)	Narocass 1 (I)	Narocass 1 (I)
4	TME 14/Nankinga (I)			

Local (L), New variety, recently released (N), Improved variety (I)

Table 11. Varieties grown in the community and ranking in order of preference (FGD)

Importance	Men’s FGD	Women’s FGD	APAC	LUWEERO
1	Bao (11)	Bao (9)	Bao (20)	Nankinga/TME14 (8)
2	Nankinga/TME14 (6)	NASE 14 (7)	NASE 14 (12)	Buyuki (6)
3	NASE 14 (5)	NAROCAS1 (6)	NAROCAS1 (7)	Mawejja (4)
4	Nase 19 (3)	Naluyima (3)	Ebong ebong (3)	Kazza (4)
5	Ebong ebong (3)	Mawejja (3)	Nase 19 (3)	Njule (4)
6	Buyuki (3)	Buyuki (3)		
		Aunt Jane (3)		

Note: the numbers refer to weights given to varieties

3.3.1 Reasons why men and women prefer some varieties

It suffices to note that the ability to produce high yeild is an outstanding attribute for men and women in both regions (Table 12). In addition, disease resistance and market value of the variety is key for men and women. Nonetheless, men and women mentioned specific trait preferences for each variety as is narrated from FGDs below.

Apac district

Bao was the most preferred variety for preparing boiled cassava in Apac because ; “It is resistant to disease, not bitter, cooks fast, is soft and produces white food and has big tubers”. “Its texture does not change even if it is raining or it is during drought”. “The roots are not fibrous. Flour from this variety is used for plastering the house”. “It has long in ground storage of about 2-4 years. Prepares soft boiled cassava and it is easy to peel”.

“Narocass 1 is commonly used for making local brew because it produces bitter roots”. “The stems have a ready market and it is high yielding”. A woman narrates “It (Narocass 1) makes a very strong local brew which has a nice aroma”. Nase 14 is used for a variety of products as a woman narrates. “We use it to prepare boiled cassava, mashed boiled cassava (mogo myeno), cassava flour and it produces a lot of local brew”. Another supliments “it makes local brew because it is bitter”. Additionally “besides the product, it is grown because it is early maturing”. Nyaraboke is not a common variety in the community. “It has long in ground storage of about 3-4 years. Prepares soft boiled cassava and it is easy to peel”. Products: boiled cassava, mogo myeno, local brew.

Luweero

The parishes had different names for the same varieties. However, Nankinga an old improved variety was common in two parishes. The varieties were tagged to trait preferences as naratted below;

“Nankinga is good for katogo and boiled cassava because the roots are sweet”. High yielding “Nankinga produces many long tubers and it is early maturing (takes only 6 months to mature).”

Jamali-it is mainly for fried cassava. When the roots are boiled, they behave as if they are spoilt (muwutta). Jamali is early maturing (takes about eight months to mature) and has a long shelf life of up to three days. Kaza is sweet, soft when boiled, mealy (akuumuka nga lumonde), has high yield, and long in soil storability of up 2 years. The variety produces very large roots. Moreover a woman narrates “one can harvest one root and it is enough for a meal.”

It is key to note that there was a diversity in the responses given across regions. For example in Apac district, the local variety Bao was the most preferred variety of cassava yet in Luwero district, TME14 was the most preferred. However, looking at preferences by gender, women still ranked Bao as the best for food but emphasised that even if the improved varieties (Narocass 1 and Nase 14) were bitter, they make good local brew (moga moga) with the best aroma and quantity. There was also diversity in the common varieties grown by sub-county. In Apac sub-county Apac district, local varieties were the most preferred compared to Chegere sub-county where most farmers prefered the improved varieties purposely for stem production, flour and local brew. It was noticed that farmers from this sub-county were business oriented compared to their counterparts. In Luwero, varieties were preferred based on the ability to process high quality boiled cassava. In Apac, preferences were based on a diversity of attributes beyond quality boiled cassava traits. Thus, in addition to the attributes of high quality boiled roots, they considered, stem quality, inground storage and the quality of potent gin (quantity, aroma and concentration).

In Luweero, the type of varieties grown depended on the eating habits of the farmers. This was also affected by the ethnicity of the farmers. In Butuntumula sub-county, varieties such as Caritus/Kawuki, Nankinga and Njule were the most commonly grown varieties while in Kabakedi sub-county, there was a diversity of cassava varieties, including a bitter variety particulary found to be grown among a small migrant farmer community whose origin was Northern Uganda. Similar to Apac, this community in Kabakedi also consumed marshed cassava (mugunu) and brewed alcohol (lira lira). Their acceptance of bitter varieties presented a sharp contrast to other communities in Luwero.

Table 12. Reasons why the variety is grown (II)

Variety and products	Reasons why preferred	% of women citing	% of men citing	Apac	Luwero
Nase 14 (I)	High yielding	26.2	36.8	22.5	40
	No disease/resistant	14.3	13.2	15	15
	Market/selling	7.1	18.4	20	5
	Early maturing	16.7	23.7	2.5	40
	Not bitter	11.9	13.2	0	25
	Not fibrous	0	2.6	0	2.5
	Big tubers	7.1	0	0	7.5
Bao (L)	High yielding	2.4	7.9	10	
	No disease/resistant	2.4	2.6	2.5	
	Marketing/Selling	2.4	10.5	12.5	
Narocass1 (N)	High yielding	7.1	8.0	12.5	2.5
	No disease/resistant	4.8	8.0	7.5	2.5
	Market/selling	4.8	5.2	2.5	2.5
	Early maturing	2.3	0	0	2.5
TME 14 (I)	High yielding	14.3	5.3	2.5	5
	No disease/resistant	2.4	5.3	0	20
	Market/selling	0	2.6	0	2.5
	Early maturing	4.7	0	0	5
	Not bitter	7.1	2.6	0	10
	Not fibrous	2.4	2.6	0	5
	Big tubers	2.4	2.6	0	5

Local (L), New variety, recently released (N), Improved variety (I)

3.3.2 Planting material

Factors limiting use of improved cassava varieties in the community

Factors that limit men and women from using released cassava varieties according to FGDs are listed in Table 13. Men and women in both Apac and Luweero had similar reasons of limited use of improved varieties. Accordingly, men and women indicated limited availability of planting material and a high cost of procuring stems of improved varieties. In addition, the National Agricultural Advisory Services (NAADS) which supplies free planting materials delivers them off season. Thus a KI from Apac narrates that; ‘‘improved varieties are not freely obtained. A bag is at Ugx. 30,000. Free stems were supplied late so few farmers planted. Thus, only the few who planted sell the stems’’.

Additionally, farmers reported that new varieties are succumbing to diseases, have short soil storability compared to the local varieties, give a low farmgate price for cassava, and are bitter especially during the dry season. Nevertheless, there are some coping strategies to help mitigate the above mentioned challenges. Practicing good field sanitation such as cutting down and burning diseased plants whilst growing hardy local varieties like Bao has helped reduce the disease burden. The farmers are now forming groups from which improved planting materials are accessed through Operation Wealth creation and other NGOs.

Table 13. Challenges limiting use of released crop varieties in the communities generated from FGDs

Community name	Which factors/challenges could be limiting use of improved crop varieties in this community?	How have these been addressed?
Apac		
Atama Parish, Agulu division, Apac municipality Apac district	They have succumbed to disease and they are bitter when boiled. They don't delay in the garden like BAO which can stay in the garden for over 2 years when you are still harvesting.	We have addressed disease challenges by telling people to cut down the plants which are diseases and burning the residues. We are growing BAO which stays in the garden for long. (Long in ground storage of roots)
	The high cost of planting materials. The cuttings for Narocas 1 and Nase 14 have a high market demand especially among NGOs which buy them off from the farmers for supply to their clients in other districts of the country. This has disrupted the traditional seed systems where farmers used to get cuttings for free from their neighbours' fields given that those with cuttings of preferred varieties can earn a leaving from sale of these cuttings. The government program operation wealth creation (OWC) distributes some planting material to farmers but at times they supply material either late or off season.	using OWC supplied clones
Apac, Okele Parish	The improved varieties are not freely obtained. A bag is at 30,000. They were supplied by NAADs. They were supplied late so few farmers planted. So only the few who planted sell the stems.	No solution yet.
Apac/ Apac sub county/ Akaro parish	It is difficult to get planting materials since its scarce in the area. Scarcity of planting materials in the area. Local farmers find it difficult to purchase improved varieties because they cannot afford it, Large scale farmers prefer to sell it in bulk not 1-5 bags to the small scale farmers. Distribution of stems is not properly channelled. Farmers lack information how to get improved planting materials. When NAADS sent materials in the district for distribution, most farmers were not informed about the distribution so some of the materials ended up drying because they were brought towards the end of the season, that is (October to November).	Farmers should come together and form groups which will give them access to get planting materials 10 bags and above.
Apac / Apaci / Awir	Problem of CBSD is getting common in the community. Some flour quality is not good for some varieties and others are bitter.	Getting improved varieties which are tolerant to CBSD that is NAROCASS 1. For the quality flour Nase 14 and NAROCASS 1 has solved this problem.
Apac / Chegere/	The people in the area think if you plant improved varieties they will all rot.	They need to be trained how to plant clean planting materials in the area. They also lack Agricultural Extension Agents in their sub county

Community name	Which factors/challenges could be limiting use of improved crop varieties in this community?	How have these been addressed?
Apac / Chegere/Chegere	She wants to plant NAROCASS 1 next season 5 acres but her biggest problem is getting clean planting materials.	She needs assistance from NARO to supply improved varieties for their group WEK NYEKO GROUP
	Challenges buying improved varieties is costly to a farmer and NAROCASS 1 is scarce in the area.	
Luwero S/County / Bwaziba Parish	Not everybody has grown improved varieties.	Increase awareness among farmers
Luweero	Presence of Cassava brown streak disease in the area is affecting most of the varieties grown by farmers. Prolonged drought is affecting the growing of cassava because after planting sunshine sets in. Low price of cassava in the market 1 acre of cassava roots can cost only 500,000= and yet the cost of production is higher than the required amount. Workers are not many in the area and they can demand for more money for labour.	These challenges like availability of tractors to open up more land for farmers should be addressed and government should avail them in each sub county. Availability of spray pumps in villages/groups can be availed to spray weeds in farmers gardens before planting cassava. Availability of graters in each group of farmers to process roots into chips and storage facilities in each village for their produce should be addressed too. Provision of clean planting materials of cassava like NAROCASS 1 in the community for multiplication is important.
Luwero /Kakinzi Mulima Village	Limited access.	NAADS should supply improved varieties to the community.

3.3.3 Important characteristics of the crop (in general not specific to the product)

Characteristics of a good cassava crop as described by male and female respondents in Apac and Luweero are shown in Tables 14 and 15. Overall preference among the respondents were predominiately agronomic characteristics such as high yield, resistance to diseases, early maturity, drought resistance and long in-ground storability. Sweet taste was the most prominent culinary characteristic identified by both men and women in Luweero and Apac followed by soft boiled cassava as described by women in Apac.

As Table 14 shows, both men and women selected disease resistance, high yield and sweet taste as their top three characteristics. Women in addition identified drought resistance and soft boiled cassava whereas the men had long in-ground storability and marketable roots. Results from individual interviews in both districts showed that men and women ranked disease resistance and high yield among the top two priority characteristics. Sweet taste and early maturity were also common to both regions. Apac also identified big size roots and soft boiled cassava while Luweero had drought resistance and long in-ground storability.

Table 14. Characteristics of a good crop (II)

Importance	Women	Men	Apac	Luweero
1	High yielding (68)	Resistant to diseases (53)	Resistant to diseases (78)	High yielding (46)
2	Resistant to diseases (61)	High yielding (43)	High yielding (65)	Resistant to diseases (36)
3	Sweet Taste (35)	Sweet taste (26)	Sweet taste (38)	Early maturing (32)
4	Early maturing (25)	Long in-ground storage (16)	Big size roots (9)	Drought resistant (23)
5	Drought resistant (18)	Early maturing (15)	Early maturing (8)	Sweet taste (23)
6	Soft boiled cassava (11)	Marketable roots (14)	soft boiled cassava (8)	long in-ground storage (21)

Table 15: Most important crop characteristics in order of preference (FGD Q7.1)

Importance	Men's focus groups	Women's focus groups	Apac	Luweero
1	Sweet taste (9)	Green and shiny leaves (9)	Green and shiny leaves (13)	Disease resistant (8)
2	High yielding (7)	Sweet taste (7)	Sweet taste (9)	Sweet taste (7)
3	Disease resistant (7)	Many nodes on the stem (4)	High yielding (5)	Long in-ground storage (5)
4	Green and shiny leaves (4)	Disease resistant (4)	Disease resistant (3)	High yielding (5)
5	Long in-ground storage (3)	Healthy crop with vigor when growing (3)	Many stems (3)	Drought resistant (5)
6	Many stems (3)	High yielding (3)	Moderate stem size (3)	Early maturing (4)
7	Moderate stem size (3)	Long in-ground storage (3)	Many nodes on the stem (3)	
8	Non-woody root (3)			

3.4 Uses of the Crop

3.4.1 Products processed from cassava and related traits

Characteristics preferred for each product processed from cassava is presented in Table 16 while frequencies of men and women in Luweero and Apac who mentioned the different products is presented in Table 17. The most common products from cassava are boiled cassava, alcohol, fresh roots, pancakes, cassava flour, leaves, mashed cassava, fried cassava chips, dried cassava chips and stem cuttings. Both the men and women processed boiled cassava and alcohol from cassava roots (Table 16). Men preferred to process mashed cassava and boiled cassava whereas women preferred to process pancakes, cassava flour and cassava leaves from cassava. In Apac, boiled cassava was the most important product derived from cassava closely followed by alcohol and pancakes. In Luweero however, cassava flour was the most important product closely followed by boiled cassava and cassava leaves.

Table 16: Summary table of products and important characteristics (FGD Q8.1 and 8.3)

Product	Men's FGD	Women's FGD	Apac	Luwero
Boiled cassava	Sensory: white colour, sweet, not bitter, soft, non fibrous, mealy nice aroma Shelf stability: long shelf-life Chemical composition: high starch content Processing: fast cooking, easy to peel	Sensory: white colour, smooth, clean, sweet, not bitter, hard, non woody, soft, firm, non-fibrous, mealy, nice aroma Processing attributes: fast cooking, easy to peel Agronomic: early maturing	Sensory: white colour, smooth, clean, non-fibrous, firm, sweet, not bitter, hard, soft, nice aroma, Shelf stability: long shelf-life, Chemical composition: high starch content Processing: fast cooking, easy to peel	Sensory: white colour, sweet, not bitter, soft, non fibrous, mealy, non woody, nice smell Agronomic: early maturing
Dried chips	Sensory: white colour Chemical: low moisture content Agronomic: disease-free	Sensory: clean, smooth Agronomic: Rot-free Processing: fast drying	Sensory: white colour, clean, smooth Chemical: low moisture content Processing: fast drying Agronomic: Rot-free, disease free	
Pancakes	Sensory: Not bitter	Sensory: Not bitter, non fibrous	Sensory: Not bitter	Sensory: Non fibrous
Waragi/Brew	Bitter	Bitter, soft	Bitter, soft	Bitter
Mogo-myeno	Sensory: white colour, sweet, soft Processing: fast cooking, easy to peel		Sensory: white colour, sweet, soft Processing: fast cooking, easy to peel	
Fresh roots	Sensory: white colour, sweet, soft, Processing: fast cooking, easy to peel	Sensory: pink skin, intact skin, smooth, thick diameter, not bitter, non fibrous Shelf stability: long shelf-life Processing: easy to peel Agronomic: disease free, rot free	Sensory: smooth, thick diameter, sweet, non fibrous Processing: easy to peel Agronomic: rot-free,	Sensory: pink skin, intact skin, not bitter, non fibrous Shelf stability: long shelf life Agronomic: disease-free
Moga-moga	Sensory: not chewy, bitter, not sweet Chemical: high dry matter Processing: Easy to peel		Sensory: not chewy, bitter, not sweet Chemical: high dry matter Processing: Easy to peel	
Pot-mogo/ vegetables	Agronomic: disease-free		Agronomic: disease-free	
Fried chips	Sensory: sweet, soft	Sensory: not bitter, soft	Sensory: sweet, soft	Sensory: not bitter, soft
Roasted	Sweet, soft		Sweet, soft	
Flour		Sensory: white colour Chemical: high starch Processing: cohesive on cooking, thickening on cooking		Sensory: white colour Chemical: high starch Processing: cohesive on cooking, thickening on cooking
Animal feed		Thick peels, small leaves, light green leaves		Thick peels, small leaves, light green leaves

Table 17. Frequency of men and women in Apac and Luweero who process different products from cassava

Product	Men's FGD	Women's FGD	Apac	Luweero	Total
Boiled cassava	7	8	8	7	15
Fresh roots	7	3	4	6	10
Alcohol	7	6	7	6	13
Mashed cassava	5	2	4	3	7
Fried cassava chips	5	1	1	5	6
Stem cuttings	4	1	4	1	5
Pancakes	4	6	6	4	10
Cassava flour	4	5	1	8	9
Leaves	2	5	1	6	7
Dried cassava chips	2	3	4	1	5
Peels	0	4	0	4	4
Katogo	1	0	0	1	1
Roasted cassava	2	0	1	1	2
Starch	1	0	0	1	1
Firewood	1	3	0	4	4

Note: number refers to the number of FGDs

3.5 Division of labour regarding cassava activities

3.5.1 Division of Labour for processing and/or selling boiled cassava in Luweero and Apac districts

Results from Luweero and Apac FGDs show that processing cassava roots into boiled cassava is a responsibility of women and female children (Table 18). In addition, boiled cassava in Apac and Luweero is majorly sold by women in communities. Men and women's FGDs in Apac were in agreement that women and/or female children were responsible for processing of boiled cassava. In addition, the women's FGD in Chegere and Akere, indicated that bachelors and boys were recently getting involved in such activities. In Luweero, men and women in FGDs unanimously agreed that women and/or female children were responsible for processing boiled cassava. In addition, men and women in FGDs mentioned that sell of boiled cassava was a feminine role (Table 18). However, boiled cassava is not sold in Kabakedi and Butuntumula (Table 18).

Table 18. Persons responsible for processing and selling boiled cassava in the household

Male/female FGD + Community name *	Persons responsible for processing labour	Persons responsible for selling
Women FGD, Akere, Apac	The process is mainly done by women and daughters but, these days even boys have started. Naturally, men are not made for that.	In markets, it is sold by women
Men FGD, Akere, Apac	The process is mainly done by women and female children	In markets, it is sold by women
Women FGD, Awir, Apac	Women	Women
Men FGD, Awir, Apac	For the married, cooking is majorly a woman's job. "Mingling is meant for women, we men can't" said one respondent drawing protest for other members. "I can't starve because the woman is not there" urged one man. "I mingle and eat!" "If you cook when a woman is around, the next day you find yourself before the elders' council and they will beat you up" narrated one youth respondent. "The woman will say there was good sauce and he chased me" another cheeky man reported.	Yes. Sold by women because they are the ones who do the cooking. "men do not want to be seen selling cassava" said one man. " They are shy, they say that is women's work"
Women FGD, Chegero, Apac	All preparation is commonly done by women.	Sold mainly by women to school children and in trading centers
Men FGD, Chegero, Apac	Women	Yes. Sold by women in schools and trading centres
Women FGD, Chegele, Apac	Women and bachelors	Women sell to bar owners who are men
Men FGD, Chegele, Apac	Women	Women and girls
Women FGD, Kabakedi, Luweero	All these activities are done by women	Boiled cassava is not sold
Men FGD, Kabakedi, Luweero	Women	Not sold
Women FGD, Bwaziba, Luweero	Women and daughters in the household	Women
Men FGD, Kiberenge/ Kakakala Luweero	Typically, cooking is a preserve of women in this community	Sold by women
Women FGD, Kakinzi, Luweero	Women	Women
Men FGD, Bukambuga,Katuumu, Luweero	Cooking is done by women	Women
Women FGD, Butuntumula, Luweero	Women and girls	It is not sold
Men FGD, Butuntumula, Luweero	Women	Not sold

3.6 Decision making and trade-offs between the different uses of the crop

Decisions on how cassava is used from the IIs are summarised in Tables 19 and 20. Men and women can independently make decisions on variety, use, sell, of cassava and use of profits generated from selling cassava (Table 19). The majority of male and female respondents indicated that decisions about cassava were made jointly by men and women in the household (Table 19). However, individually, female respondents cited that such decisions are made by women. In addition, female

respondents also mentioned that decisions are made together with their children. In terms of region, the largest proportion of respondents in Apac cited joint decisions most followed by men and the entire family, with women having the least say in the decision making. However in Luweero, women had the most say regading decisions followed closely by joint decisions between men and women.

Table 19. Mean score of independence in decisions by sex and region (II 16.4)

Decision	Mean score of independence 1-4*			
	Women	Men	Apac	Luwero
Variety of crop to plant	3.1	3.2	2.9	
Use of crop	3.2	3.1	3.1	
Marketing	3.1	3.2	2.9	
Use of profits from sale of [specify product]	3.0	3.2	2.9	
Use of profits from sale of alternative product	2.9	3.2	2.9	

Table 20: Frequency of citations of people who make decisions on how cassava is used by sex and region (II Q16.4 original or II Q16.3 revised)

People who make decisions on the product	% of women citing N=33	% of men citing N=19	% of Apac citing N=29	% Luweero citing N=23
Men	**9.1**	**5.3**	**10.3**	**4.3**
Women	33.3	5.3	3.4	47.8
Men and women	48.5	84.2	75.9	43.5
Women and children	3.0	0.0	0.0	4.3
Children				
Everyone	6.1	5.3	10.3	0.0

Decisions on the proportion of cassava grown that can be consumed at home

Overall, the decision on the proportion of cassava to consume at home (as opposed to selling) according to female and male respondents is mainly made jointly by both men and women (Table 21). Men and the entire family (everyone) were cited least. In Apac, joint decision making was cited most often, followed by women, everyone and lastly men. In Luweero, women were cited most often, followed by joint decision (men and women). Men were not involved in making this decision in Luweero.

Table 21. Who makes decisions on the proportion of cassava to consume at home

People who make decisions on the proportion to consume	% of women citing N=33	% of men citing N=19	% of Apac citing N=29	% Luweero citing N=23
Men	3.030303	5.263158	6.896552	0
Women	45.45455	26.31579	24.13793	56.52174
Men and women	45.45455	63.15789	58.62069	43.47826
Women and children				
Children				
Everyone	6.060606	5.263158	10.34483	0

The decision to sell according to female respondents is mostly made jointly (men and women) followed by women alone, men alone and the entire family (everyone) (Table 22). Male respondents also cited joint decision making followed by men alone, women alone and everyone. Outside of the joint decisions, female respondents cited women alone while the males cited men as being more involved in decision making regarding cassava sale. In Apac, the decision on proportion to sell was made jointly followed by men alone, women alone and everyone (Table 22). In Luweero, joint and women alone were equally cited most followed by men alone. Therefore men were more involved in sale decisions in Apac whereas in Luweero it was women.

Table 22. Who makes decisions on the proportion of cassava to sell

People who make decisions on the proportion to sell	% of women citing N=24	% of men citing N=18	% of Apac citing N=28	% Luweero citing N=14
Men	12.5	27.77778	21.42857	14.28571
Women	29.16667	16.66667	14.28571	42.85714
Men and women	50	50	53.57143	42.85714
Women and children				
Children				
Everyone	8.333333	5.555556	10.71429	0

3.7 Preparation and processing the product

Both men and women's FGDs in Apac indicated that cassava was prepared by peeling, chopping, immersing sliced cassava is water and boiling (Table 23). In contrast, in Luweero the common practice was peeling, slicing, wrapping in banana leaves and steaming. In addition, there is varation in products processed in Apac and Luweero. Accordingly, some men and women mash cassava upon boiling into a product locally called *Mogo myeno* in Apac and Mugunu in Luweero. Moreover, scrapping of the inner skin (kalakata) was a common practice in Luweero, but not practiced in Apac.

Table 23. Variation in processing boiled cassava in the study locations

Male/female FGD + Community name *	Processing and preparation steps for boiled/steamed cassava	Variations of the product and variations of the processing of the [product] in your community
Women FGD, Akere, Apac	Boiled cassava Chop/ cutting into peel able pieces Peeling Slice Remove the middle fiber Wash and rinse Put in sauce pan Add water about 2 mags for 3 tubers as big as a novida bottle Cover with another sauce pan and boil When the water dries. If there is little noise coming from the source pan	Mingled cassava Chop Peel Slice Cut into small pieces Add water- slightly more. Where you would put two mugs, put about 4 Boil Leave some water Mix with a stick like you would cassava or maize flour to make a paste
Men FGD, Akere, Apac	Boiled cassava Chop/ cutting into peelable pieces Peeling Slice Remove the middle fiber Put in the source pan add water about about half way the cassava. Cover cassava with either banana leaves or with another source pan Boil for 45-60 minutes	Mingled cassava Chop/ cutting into peelable pieces Peeling Slice Remove the middle fiber Put in the source pan add water about half way the cassava. Cover cassava with either banana leaves or with another source pan Boil for 45-60minutes When the water is about get finished (this can be sensed by a decrease in the sound the food makes while boiling) you mingle the food until it becomes a paste.
Women FGD, Awir, Apac	Boiled cassava Cut into pieces which are easy to peel Peel Wash Slice Put in a source pan Pour 2-3 cups of water Cover with a source pan Boil for 30-45 minutes	Mashed cassava (Mogo myeno) Cut into pieces which are easy to peel Peel Wash slice Cut into small pieces Put in a source pan Pour 3-4 cups of water Cover with a source pan Boil for 30-45 minutes Leave some water when ready Mash with a stick

Male/female FGD + Community name *	Processing and preparation steps for boiled/steamed cassava	Variations of the product and variations of the processing of the [product] in your community
Men FGD, Atana, Apac	Boiled cassava Cut off the wooden attachment of root to stem Peel and slice to small cuboidal pieces longitudinally Remove the middle thread part Wash twice in water Put in sauce pan and add water to just below the cassava level in the saucepan Cover with fresh banana leaves then with sauce pan Put to fire until when the water is finished (vaporises) – about 30 minutes	Mashed cassava Cut off the wooden attachment of root to stem Peel to remove outer cover Remove the middle thread part Slice to very small cubes Wash twice in water Put in sauce pan and add water until the cassava is completely covered Cover with fresh banana leaves then with sauce pan Put to fire until when the water is just about finished but not completely finished Mash with a mingling stick until you obtain a consistent paste while saucepan is still on fire but at very low heat intensity Serve hot with a nice sauce like gweno (chicken), lapena (pigeon pea), fresh fish, vegetables
Women FGD, Chegero, Apac	Boiled cassava Wash saucepan Put 2 cups of water or water just below cassava level Cut off wooden attachment to stem Peel to expose flesh Cut into small cubes longitudinally Wash in water twice Put in saucepan with desired water volume Cover with another saucepan Put on fire for 30-45 minutes depending on variety and fire intensity Cassava is ready when water dries up. Put off fire and serve	Mingled cassava Put water in saucepan estimated at above the cassava level in saucepan Cut off woody root attachment to stem Peel to expose flesh and wash twice in water slice the cassava into very small pieces (cubes of about 2 cm) Wash again and add to the saucepan with measured water volume Put on fire until the water just about dries up but not completely finished (you will tell this when boiling sound changes)
Men FGD, Chegero, Apac	Boiled cassava Chop/ cutting into peelable pieces Peeling Slice Remove the middle fiber Put in the source pan add water about about half way the cassava. Cover cassava with either banana leaves or with another source pan Boil for 45-60minutes	Mingled cassava Chop/ cutting into peelable pieces Peeling Slice Remove the middle fiber Put in the source pan add water about half way the cassava. Cover cassava with either banana leaves or with another source pan Boil for 45-60minutes When the water is about get finished (this can be sensed by a decrease in the sound the food makes while boiling) you mingle the food until it becomes a paste.

Male/female FGD + Community name *	Processing and preparation steps for boiled/steamed cassava	Variations of the product and variations of the processing of the [product] in your community
Women FGD, Chegele, Apac	Boiled cassava Chop to remove the top and rare Chop to reduce the length Peel Spilt the root Slice and remove middle fibre Wash and rinse Put slices in clean source pan Add water Boil for about 20 minutes	Mashed cassava Chop to remove the top and rare Chop to reduce the length Peel Spilt the root Slice and remove middle fibre and cut into small pieces Wash and rinse Put slices in clean source pan Add water Boil for about 30-40 minutes. Leave some water when cassava is ready Press with the stick that has a flat base then mix to form a paste
Men FGD, Chegele, Apac	Boiled cassava Remove the tips by chopping Cut into pieces which are easy to peel Peel If the size is too big slice Remove the middle fiber Slice into about four pieces Wash and rinse *3 Put in a source pan Pour water (water should be below the slices of cassava Cover with a source pan or with banana leaves Boil for one hour	Mashed cassava Remove the tips by chopping Cut into pieces which are easy to peel Peel If the size is too big slice Remove the middle fiber Slice into small cubes pieces Wash and rinse *3 Put in a source pan Pour water (water should be below the slices of cassava Cover with a source pan or with banana leaves Boil for one hour When ready leave some water and mix
Women FGD, Kabakedi, Luweero	Steamed cassava Peel, slice, wash twice, put in banana leaves, put banana stalks in the source pan, add water (about 4cups) and boil for one hour.	Mashed cassava (Mugunu) Peel, slice, do not kukolokota to retain starch (don't remove the outer layer after peeling) cut into small pieces, put enough water and boil for 30 minutes, Wash a mortar and a pestle put cassava and pound until it is soft and serve

Male/female FGD + Community name *	Processing and preparation steps for boiled/steamed cassava	Variations of the product and variations of the processing of the [product] in your community
Women FGD, Bwaziba, Luweero	Steamed cassava Peeling Washing twice Slicing Prepare the source pan with water and banana leaves “mizingonyo” Cover with banana leaves Steam for about one hour	Boiled cassava Peeling Washing twice Slicing Put in the source pan Pour water upto just below the slices of cassava Cover with banana leaves Boil for about 30 minutes Mashed cassava Peeling Washing twice Slicing Cut it into small pieces Put in the source pan with water Cover with banana leaves Boil for about 30 minutes and leave some water in the source pan Mix with a stick
Men FGD, Kiberenge/ Kakakala Luweero	Steamed cassava Peel to remove outer coat Cut into smaller pieces Remove the middle thread layer Wash twice with water Wrap in fresh banana leaves Lay fresh banana leaf midribs in bottom of saucepan Put water in saucepan, 5 cups or depending on size of saucepan Boil for 30-45 minutes depending on the intensity of the fire	
Women FGD, Kakinzi, Luweero	Steamed cassava Peeling Removing the inner skin (kukolokota) Washing Slicing Remove the middle fibre Prepare source pan Put cassava in prepared sauce pan Steam	

Male/female FGD + Community name *	Processing and preparation steps for boiled/steamed cassava	Variations of the product and variations of the processing of the [product] in your community
Men FGD, Bukambuga ,Katuumu, Luweero	Steamed cassava Peeling Removing the inner skin (kalakata) Slicing Washing Preparing the source pan by putting banana leaves (ne mizingongonyo) Place cassava in the prepared source pan Cover with banana leaves Boil for one hour	
Women FGD, Butuntumula, Luweero	Steamed cassava Peeling Removing the inner skin (kalakata) Slicing Washing Preparing the source pan by putting banana leaves (ne mizingongonyo) Place cassava in the prepared source pan Cover with banana leaves Boil for one hour	
Men FGD, Butuntumula, Luweero	Steamed cassava Peeling Removing the inner skin (kalakata) Slicing Washing Preparing the source pan by putting banana leaves (ne mizingongonyo) Place cassava in the prepared source pan Cover with banana leaves Boil for one hour	

3.8 Consumption of the product

Beans were the most cited soup consumed with boiled cassava by both men and women's FGDs in Apac and Luweero (Table 24). Other kinds were fish, chicken, vegetables, groundnuts and beef soup. In Chegele-Apac and Bwaziba-Luweero, women mentioned that cassava can be eaten with any accompaning soup.

Table 24. Summary description of the different sauces that the boiled cassava is consumed by communities (FGDs).

Male/female FGD + Community name *	What is the boiled/steamed cassava consumed with?
Women FGD, Akere, Apac	With beans because of our income status. Preferably it is eaten with fish or chicken
Men FGD, Akere, Apac	With beans because of our income status. Preferably it is eaten with fish or chicken
Women FGD, Awir, Apac	
Men FGD, Atana, Apac	Beans is commonest sauce
Women FGD, Chegero, Apac	Beans, vegetables
Men FGD, Chegero, Apac	Beans, chicken, fresh fish, vegetables
Women FGD, Chegele, Apac	Chicken, fish, beans and ground nuts Cassava can be eaten with anything it doesn't select. It is like a lorry. It can even be accompanied with milk and black tea.
Men FGD, Chegele, Apac	The un-mashed is eaten with beans, meat and vegetables Mashed is eaten with chicken and vegetables.
Women FGD, Kabakedi, Luweero	
Men FGD, Kabakedi, Luweero	Beans, Nile perch fish (mpuuta)
Women FGD, Bwaziba, Luweero	Beans, ground nuts, silver fish (mukene), meat, greens. It can be accompanied by any type of stew. It does not segregate
Men FGD, Kiberenge/ Kakakala Luweero	Beans, Nile perch fish (mpuuta)
Women FGD, Kakinzi, Luweero	Beans, vegetables, meat, fish.
Men FGD, Bukambuga,Katuumu, Luweero	Fish, beans, ground nuts (binyebwa), silver fish (mukene)
Women FGD, Butuntumula, Luweero	Usually with beans and ground nuts
Men FGD, Butuntumula, Luweero	Beans, beef, fish

Characteristics of bad boiled cassava

The most prominent characteristics of a bad boiled cassava as reported by male and female respondents in Apac and Luweero according to individual interviews were bitterness, hardness and fibrousness (Table 25). In addition, diseased roots, yellow colour and watery boiled cassava were cited by both male and female respondents in both regions. In addition, yellow colour and tasteless boiled cassava were reported as characteristics of bad boiled cassava in Apac and Luweero respectively.

Table 25. Characteristics of a bad boiled cassava (II)

Importance	Women	Men	Apac	Luweero
1	Bitterness (97)	Bitterness (59)	Bitterness (66)	Bitterness (90)
2	Hardness (59)	Hardness (39)	Hardness (57)	Hardness (41)
3	Fibrousness (34)	Fibrousness (25)	Diseased roots (26)	Fibrousness (33)
4	Diseased roots (17)	Diseased roots (24)	Fibrousness (26)	Watery (18)
5	Yellow colour (6)	Watery (19)	yellow colour (21)	Diseased roots (15)
6	Watery (5)	Yellow colour (17)	Watery (6)	Tasteless (6)

Consumption patterns of boiled cassava in the community

Key informants in Apac reported that boiled cassava was a staple food in the region and was consumed on a daily basis in most households (Table 26). They also indicated that this had not changed in the past 5 years. Consumption of boiled cassava was reported to increase during festivities such as marriage ceremonies quoting that ' culturally, cassava is served when there are masses of people in the lango area'. However, some Key Informants noted that cassava is mainly eaten by poor people on a daily basis while the rich sometimes eat rice. All in all, they reported no variation in cassava consumption in the community.

In Luweero, which is located in central region, boiled or steamed cassava was not consumed on a daily basis. This was mainly because there is diversity in foods consumed (Table 26). In Luwero, the Key Informants reported that they have alternative staple foods such as matooke, sweet potatoes and maize among others. In addition, cassava is said not be a stable food in this area.

Table 26. Consumption patterns of boiled cassava in the Luweero and Apac (KII)

Community name	Thinking of people in your community, how often is the product consumed. Is this the same for everyone in the community? Probe on social segmentation. How has this changed in the last five years?
Apac	Poor and moderate consume boiled cassava daily. The rich mostly consume rice. They consume boiled cassava once in a while. There haven't been a change because in our culture in the lango sub-region cassava is a major staple food.
Atana Parish, Agulu division, Apac municipality Apac district	For boiled cassava, the consumption is consistent on a daily basis with periodic peaks during festivities like marriage ceremonies or burial ceremonies. On such occasions, it is cultural to serve the masses that have gathered with some cassava. For the waragi, consumption, it is daily but also goes up during ceremonies and the festive season. Increased demand for waragi implies increased demand for dried cassava chips. This benefits women since they are the main processors of dry cassava chips.
Apac, Akere Parish	Boiled cassava in the family is eaten daily for example it is eaten as an accompaniment with tea, children take it and eat it at school. Boiled cassava is sold and eaten daily from the road side. Waragi is taken in peri- urban areas daily. The village is a hub for brewing and selling is in the town. If you fail to plant cassava in a year, you are headed for doom. It is a culture for the house hold to plant cassava every year. This is a practice for everyone in the community apart from the Balalo. It has been a culture for more than 20 years.
Apac/ Apac sub county/ Akere parish	Farmers eat cassava daily, other seasons it varies because there are alternative crops that is maize and sweet potatoes which are also eaten. When cassava matures, they start selling it seasonally. Cassava chips are really processed in the community and if so in a very small scale. For female headed households, she has a right to sell her cassava roots. Minority group like children have no right to sell cassava products.
Apac / Awir	Cassava is eaten daily, seasonally and no variation every year and common for everyone in the community.
Apac / Chegere/	There is no variation on consumption and is the same for everyone in the community
Apac / Chegere/Chegere	Traditionally eating habits has not changed, it is the same throughout the years.
Luwero S/County / Bwaziba Parish	They eat cassava daily at every season and it's the same for everyone in the community
Luweero	Boiled / steamed cassava is not eaten every day or every season. They have alternative crops to eat like matooke, sweet potatoes, and posho. Yes it varies per season and per year too.
Luwero /Kakinzi Mulima Village	Potatoes, Posho and Matooke is mostly consumed by the community, cassava is really consumed 2 times a week in most households and does not vary every per season

Changes in the marketing patterns of boiled cassava in the community

In Apac, people buying boiled cassava had decreased or remained unchanged over the five year period in question (Table 27). This was because most households produced their own cassava and

therefore did not have to buy. However, some key informants reported an increase in the sale/purchase of other cassava products such as stem cuttings, alcohol (waragi) and pancakes. A decline in trade of fresh roots was attributed to reduced yields associated with diseases such as CBSD and CMD which mainly affect the local variety (Bao) which is predominantly grown in this area.

In Luweero, the key informants gave divergent views with one reporting a decline in trade of fresh roots linked to low yields while another indicated an increase due to greater access to villages where traders bought cassava roots cheaply (Table 27). Another indicated that cassava trade had remained more or less the same over a five year period since it was not a priority cash crop compared to say coffee which was grown on a large scale. However, it was also noticed during this survey that majority of the farmers grow cassava on small scale since it is not their priority crop and due to the fact that there is a problem of land fragmentation. This might be one of the reasons why most KII where contradicting comments.

Table 27. Changes in the marketing patterns of boiled cassava in the community (KII)

Community name	Do you think people are buying more or less compared to five years ago? Why? Probe on social segmentation. How has this changed in the last five years?
Apac	People who are buying boiled cassava re decreasing because people have planted their own. Boiled cassava is mostly bought by women because they have a lot of work so they have little time to do all work. They buy boiled cassava to be eaten their children.
Atana Parish, Agulu division, Apac municipality Apac district	There is increased sale of cassava stem cuttings but declining sale of tubers because traders are cheating farmers by offering very low prices.
Apac, Akere Parish	Those buying from the road side hotel are on transit. Students buy it at break time as a snack. It is even sold in small village markets. This has been a practice for over 20 years back. Boiled cassava is preferred because it is bulky and it satisfies. It is cheap, easy to process and fills the stomach at a low price.
Apac/ Apac sub county/ Akare parish	The community members have not changed the way they conduct their daily activities. Example Bao variety has been grown continuously even if it's susceptible to CMD. Farmers like it because of its good attributes. Improved Nase 14 has also been existence for the last five years. It is only NAROCASS 1 which has just come to the area and very few farmers are multiplying in small scale. Just because of the increased market for stems, farmers in this community have now stated growing improved varieties purposely to sell stems which fetch good money. But Bao stems are not sold they only grow it for food security (fresh roots whether local or improve, same price) sold in small scale 2-5 bags they sell a bag 10,000/= five years ago and now 20,000/= a bag of fresh roots. For stems a bag was sold 12,000/= and now its sold at 25,000/= depending on the variety.
Apac /Awir	People are buying more products compared to 5 years ago. Waragi is drunk daily and the customers are there so you can generate more money in that business. Those who are making pan cakes have market in nearby schools and churches where they can sell on weekly basis. Fresh roots are commonly sold by small-scale traders in nearby rural markets to meet the demand of customers. Women are on this business compared to men who drink waragi in their respective joints/bars on a daily basis. Increasing market demand for waragi, pancakes and fresh tubers
Apac / Chegere/	People buy less of the fresh cassava compared to 5 years ago. The local Bao variety is dominantly grown in the area and is infected with CMD and CBSD hence the yields are low and the roots are rotting these days
Apac / Chegere/Chegere	She is selling more of the cassava roots and stems to generate more money to pay school fees that is why she is concentrating growing Nase 14 from 2 acres to 4 acres now. Population has increased such that people are buying more now compared to 5 years ago.
Luwero S/County / Bwaziba Parish	People buy less fresh roots. The amount cultivated is not enough and the demand is high in Kampala. Women have gone to business while men remained digging at home.

Community name	Do you think people are buying more or less compared to five years ago? Why? Probe on social segmentation. How has this changed in the last five years?
Luweero	Buying more. People who buy the products now are many compared to 5 years ago. The traders have penetrated the villages to buy cassava roots at a cheaper price then they take to Luwero town to sell expensively to maximise profits
Luwero /Kakinzi Mulima Village	People are buying the same amount. Cassava is not a priority in this community, they prefer to grow coffee on large scale to generate income. Sweet potatoes are grown in large scale.

Presence of taboos associated to cassava production

It was foundthat there were no taboos or restrictions of cassava production along the value chain among the different respondents in the two regions. In fact, this question made almost all respondents laugh whenever it was asked. “NO, NO, NO, NO, we have no restrictions on either producing or eating cassava”.

3.9 Product characteristics

Table 28. Table First iteration of the Step 2 WP1 product profile-MEN

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
1	Raw material characteristics for product quality (agronomic, post-harvest)	Sweetness (87)	Break the root and taste when it is not as sweet as sugar	1. Sweetness	Bitterness	Break and chew	BAO (L) NASE 14 (I) TME 14 (I) Njule (L)	NAROCASS 1 (I) ALIFAZIA (L) JAMAL
		Softness of the peel (23)	The outer peel is soft and easy to remove when you touch	2. Softness of the peel	Yellowish colour	By looking at the roots		
		Pink peel colour (19)	Upon removal or scrapping of the outer root skin, pink colour noticeable on the root cortex	3. Pink peel colour	Fibrousness	Discomfort of fibre felt in the mouth while eating		
		Easy to peel (18)	The outer peel is soft and easily removed	4. Easy to peel	Diseased roots	Unclean roots		
		Smooth skin (15)	By examining, the roots have no disease damage	5. Smooth skin	Watery	High water content in the roots; Too soft when boiled		
		Resistant to diseases (14)	Break roots to observe whether or not the root is rotten By examining to establish whether or not they are clean and with no constrictions	6. Resistant to root diseases				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
2	Processing characteristics of raw material for the product quality during processing	Sweetness (83)	Tastes sweet, but not like sugar	1. Sweetness	Hardness	During peeling, hard roots to break, chew and split easily don't make good cassava	BAO (L) NASE 14 (I) TME 14 (I) Nyaraboke (L)	
		Softness (47)	Cut and chew if the root is soft	2. Softness	Bitterness	Cut and chew		
		White colour (43)	White root, just like paper	3. White colour	Watery, with spongy middle part	By examining to establish if the middle part of the root is spongy		
		Nice aroma (29)	When cooking cassava, it will have a nice smell	4. Nice aroma				
		Non-fibrous (20)	No thread-like structures in the root when broken	5. Non-fibrous				
		Easy to peel (19)	Use minimal energy when peeling The outer skin is easily removed	6. Easy to peel				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
3	Characteristics of cooked/ready to eat final product	Sweetness (86)	Break and taste	1. Sweetness	Bitterness (59)	Break and chew		NAROCASS1(N)
		Softness (59)	Easy to break and chew	2. Softness	Hardness (39)	Use a lot of energy and effort to break and chew		
		Nice aroma (39)	By smelling the boiled root	3. Nice aroma	Fibrousness (25)	Feel the \threads while eating		
		Mealiness (11)	Has less water content when you eat	4. Mealiness	Diseased roots (24)	Unclean roots		
		White colour (6)	By examining the root, it's white like paper	5. White colour	Watery (19)	High water content Too soft when boiled		
					Yellow colour (17)	By examining the root colour		

Table 29. First iteration of the Step 2 WP1 product profile-Women

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
1	Post-Raw material characteristics for product quality (agronomic, post-harvest)	Smooth skin(12)	By examining the root, they look attractive, shining with no disease.	2.Smooth skin	Bitterness(97)	By testing, cassava tastes like quinine	BAO (L) Njule (L) Kakuta Kamyufu/Nase 13 (I) Nase 14 (I) Nyaraboke (L)	ALIFAZIA NAROCASS1 JAMALI
		Resistant to diseases (9)	By breaking and looking at the flesh, the root looks clean	3.Disease free roots	Diseased roots(17)	By breaking the roots, you notice a brownish discoloration		
		Pink/red peel colour (9)	By peeling off the outer most skin, and observe the inner skin is pink/red in colour	3. Pink/red peel	Fibrousness(34)	By breaking the roots, you find thread-like strands in the roots		
		Big size roots (6)	By looking and the roots appear big	5.Big roots	Hardness (59)			
		Easy to peel (6)	By looking, outer skin normally peels off by itself	5. Easy to peel	Very sweet like sugar (2)	By tasting, the root is sugary		
		High yielding (6)	One cassava stand with at least 10 roots.	5.High yielding	Watery (5)	During peeling, the the roots makes noise and breaks easily		
		White colour (6)	By breaking the root, the flesh looks white like paper	5. White flesh	Yellow/brown(6)	By looking at the peeled roots, the colour is not white		
		Sweetness (66)	By tasting/eating	1.Sweet taste				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
2	Processing characteristics of raw material for the product quality during processing	Sweetness(89)	Sweet, but not sweet like sugar	1.Sweet taste	Watery with spongy middle part	By examining, the middle part of the root is spongy	Kakuta kamyufu/Nase 13 (I) Njule(L) Caritus/NASE 14 (I) Nankinga/TME 14 (I)	ALIFAZIA JAMALI
		White colour (42)	After peeling, cassava is very white like paper/white beans/panadol	2. White flesh colour	Very sweet roots			
		Softness (35)	During peeling, the knife can easily cut through the flesh	3. Soft	Hardness	After peeling, it is not easy to split the roots		
		Easy to peel (32)	During peeling, the peel can easily be removed	4. Easy to peel				
		Non-fibrousness(17)	By examining, good cassava has no thread-like structures in the flesh	5.Not fibrous				
		Nice aroma(15)	When boiling, good cassava makes a nice aroma	6. Nice Aroma				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
3	Characteristics of cooked/ready to eat final product	Sweetness (97)	By testing, good boiled cassava tastes sweet, but not like sugar	1.Sweet taste	Diseased (17)	By looking, the roots are infected with hard brown things		
		Softness (70)	By breaking, boiled cassava can be easily broken and by using a thumb, the finger can easily go through	2.Soft	Fibrousness (34)	The root has fibres when it is broken		
		Nice Aroma (37)	When serving, good boiled cassava has good aroma	3.Aroma	Hardness (59)	By breaking and chewing, the roots are hard to chew		
		Non-fibrous (12)	By breaking, it can be easily broken, and by examining, no fibre	4.Not fibrous	Bitterness (97)	By tasting, it has bitter taste		
		White colour (11)	By looking, boiled cassava is as white as paper or Panadol (paracetamol) tablets	5.White colour	Yellow/brown colour (6)	By examining the root with eyes		
		Mealiness (6)	By looking, mealy cassava breaks by itself. When chewing, it feels powdery in the mouth.	6.Mealy	Watery (5)	By looking, the boiled roots are translucent		

Table 30. First iteration of the Step 2 WP1 product profile -Apac

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
1	Raw material characteristics for product quality (agronomic, post-harvest)	Sweetness (84)	Break the root and taste when it is not as sweet as sugar	1. Sweetness	Bitterness (66)	Break and chew	BAO (27) (L) NASE 14 (22) (I) NAROCASS 1 (15) (I) NASE 19 (4) (I) ALANYO DYER (1) (L) TME 14 (1) (I)	
		Easy to peel (33)	The outer peel is soft and easy to remove	2. Easy to peel	Hardness (57)	Use a lot of energy to break and chew		
		Resistant to diseases (27)	Break roots to observe if the root is not rotten By examining the roots, they are clean with no constrictions	3. Resistant to diseases	Diseased roots (26)	Un-clean roots		
		Smooth skin (22)	By examining the roots and observe that they have no disease damage	4. smooth skin	Fibrousness (26)	Feel the threads while eating		
		White flesh colour (14)	Break and see the inner colour of the roots	5. White flesh colour	Yellow colour (21)	By looking at the roots		
					Watery (6)	High water content		

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
2	Processing characteristics of raw material for the product quality during processing	White colour (58)	white like paper when cut	1. White colour	Bitterness (66)	Break and chew		
		Sweetness (51)	Tastes sweet, not like sugar	2. Sweetness	Hardness (57)	Use a lot of energy and effort to break and chew		
		Easy to peel (40)	Use minimal energy and force when peeling The outer skin is easily removed	3. Easy to peel	Diseased roots (26)	Unclean roots		
		Softness (32)	Cut and chew if is soft	4. Softness	Fibrousness (26)	Feel threads while eating		
		Nice aroma (18)	When cooking, cassava will generate a nice smell	5. Nice aroma	Yellow colour (21)	By looking at the roots		
		Non-fibrous (11)	No thread-like structures when broken	6. Non-fibrous	Watery (6)	High water content Too soft when boiled		

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
	Characteristics of cooked/ready to eat final product	Softness (81)	Easy to break and chew	1. Softness	Bitterness (66)	Break and chew	1. Bitterness	
		Sweetness (78)	Break and taste	2. Sweetness	Hardness (57)	Use a lot of energy and effort to break and chew	2. Hardness	
		Nice aroma (48)	By smelling the boiled root	3. Nice aroma	Diseased roots (26)	Unclean roots	3. Diseased roots	
		White colour (7)	By looking – it's white like paper	4. White colour	Fibrousness (26)	Feel thread-like structures while eating	3. Fibrousness	
		Non-fibrous (3)	When broken into small pieces, you don't find fibres	5. Non-fibrous	Yellow colour (21)	By looking at the roots	4. Yellow colour	
					Watery (6)	High water content	5. Watery	

Table 31. First iteration of the Step 2 WP1 product profile -LUWERO

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
1	Raw material characteristics for product quality	Smooth skin(12)	By examining, the roots are attractive with no disease.	2.Smooth skin	Bitterness	By tasting the root has a bitter taste	Kakuta kamyufu/Nase 13 (I) Njule (L) Caritus/NASE 14 (I) Nankinga/TME 14 (I)	ALIFAZIA JAMALI PARA
		Resistant to diseases (9)	By breaking and observing roots are flesh and clean	3. Disease free roots	Hardness	Hard to cut and chew		
		Pink/red peel colour (9)	By peeling off the outer skin, the inner skin(cortex) is pink/red	3. Pink peel	Yellowish/cream colour	By looking at the flesh, it is yellowish/cream y in colour		
		Big size roots (6)	By examining, the roots are big	5.Big roots	Diseased roots	By looking at the roots, infected with necrosis		
		Easy to peel (6)	By examining, outer skin normally peels off by itself	5. Easy to peel				
		High yielding (6)	After harvesting, a cassava stand, at least 10 roots are observed.	5.High yield				
		White colour (6)	By examining, the flesh is as white as paper	5.White colour				
		Sweetness (66)	By tasting/eating, cassava is sweet, but not sugary	1.Sweet taste				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
2	Processing characteristics of raw material for the product quality during processing (Step 3 will add more details here)	Sweetness (103)	Cut and taste, when it is sweet, but not like sugar	1.Sweet taste	Hardness	The roots are hard to break, chew and split easily don't make	Kakuta kamyufu/Nase 13 (I) Njule (L) Caritus/NASE 14 (I) Nankinga/TME 14 (I)	ALIFAZIA JAMALI
		Softness(32)	During peeling, the root is easy to cut and split easily	2. Soft	Bitterness	Cut and chew and roots have a bitter taste		
		Non-fibrous(16)	By looking, the flesh has no thread-like strands running across	3.Not fibrous	Watery with spongy middle part	By looking, the middle part of the root is spongy		
		Nice aroma(16)	During boiling, the boiling cassava produces an attractive aroma	3.Nice Aroma				
		White colour(15)	By looking at the peeled cassava, it is white like paper	5.Colour				
		Easy to peel (7)	During peeling, the peel can be easily removed	Easy to peel				

		Characteristics that give a good/high quality product	Indicator of high quality characteristic.	Priority of high quality characteristic.	Characteristics that give a bad/poor quality product	Indicator of poor quality characteristic.	Varieties which process GOOD Quality product. (L)-local, (I) improved older released variety or (N) new variety recently released	Varieties which process BAD quality product. (L)-local, (I) improved older released variety or (N) new variety recently released
3	Characteristics of cooked/ready to eat final product				Fibrousness (33)		Kakuta kamyufu/Nase 13 (I) Njule (L) Caritus/NASE 14 (I) Nankinga/TME 14 (I)	
		Sweetness (105)	By tasting	1.Sweet taste	Hardness (41)			
		Softness (48)	By breaking and chewing	2.Soft	Diseased (15)			
		Nice Aroma (28)	By smelling and the roots have a nice aroma	3.Aroma	Bitterness (90)			
		Mealiness (17)	By chewing and looking	4.Mealy	Watery (18)			
		Non-fibrous (11)	By chewing and the root has thread like fibres	5.Not fibrous				
		White colour (10)	By examining with eyes and the roots are white in colour	6.White Colour				

4 CONCLUSION

- Cassava is an important food and cash crop for both men and women in apac and Luweero. the crop is majorly intercropped with maize, beans, ground nuts in both regions. Processing cassava into the boiled product is traditionally a responsibility of women in. in addition, the product is generally sold by women. Decisions on the type of variety, sell and use of the profit generated is majorly made jointly in the household.
- Attributes of Quality boiled cassava product include; softness, sweet/not bitter, white color, cooks fast and not fibrous. wp2 should initiate studies to come up with empirical measures (protocals) and establish threshold or acceptable ranges for softness, color, sweetness/bitterness, and cooking time. breeders (wp4) could then introduce these traits in the breeding program.
- In the field, qualities of a good cassava variety include; high yields, resistance to diseases, has shinny green leaves and long in-ground storage. plant breeders have some of them in the selectio index. However, a decision needs to be taken by (wp4) to incorporate those which are missing.

5 FINDINGS: MARKET STUDY

Two thirds of the participants in the marketstudy were female traders most of whom belonged to the same ethnic group in the region (12 of 18 people). Apart from one coming from Lugbara and another Banyankore, traders from Luweero and Kampala were mostly Baganda. Those from Apac were of Langi ethnicity. The age range of the participants was 25 to 55 years with a mean age of 39 years and 77.7% of the participants had a primary level education. The size of the households of the traders ranged from 3 to 9 members, the mode being 5 members. Although 7 out of the 18 respondents had ownership of a means of transport, the rest owned none and relied on hiring boda boda and using taxis. All respondents owned a mobile phone.The road to the nearest town is a good distance to the market, from home the distrance ranged between 0.5 and 13km. Regarding the main occupation of the respondents, it was noted that the respondents were majorly urban level traders basically dealing in fresh cassava roots with their marketing experience ranging from 5 to 15 years. Only two of the respondents were food vendors.

Table 32: Background information on sample (MI Q1-7/1-14)

Interview	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015	016	017	018
Gender	Female	Female	Female	Female	Female	Female	Male	Male	Female	Male	Female	Male	Male	Male	Female	Female	Female	Female
Age (profile)	38	35	38	50	46	55	41	45	37	37	37	25	45	28	40	32	35	35
Ethnicity	Muganda	Muganda	Muganda	Muganda	Muganda	Muganda	Munyankore	Muganda	Muganda	Muganda	Langi	Langi	Langi	Lugwara	Muganda	Muganda	Muganda	Muganda
Household size	5	5	6	5	8	5	5	5	4	9	6	4	9	4	5	5	3	3
Level of education	No education	S3	P5	P7	P6	P7	P7	S1	P4	P5	P7	P6	S4	P7	P7	P7	P3	P3
Ownership of means transportation (If yes, type)	No	No	No	No	No	No	Uses taxi	Uses Boda boda	No hires	No	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ownership of means of communication (If yes, type)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Road to nearest town is good (Y/N)	Y	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to market from home (km)	0.5km	1km	0.5km	1km	10km	4km	4km	2km	13km	7km	6.7km	1km	1km	7	5km	1km	2km	2km
Marketing experience (years)	7	7	15	15	14	10	10	10	8	12	5	13	5	10	10	5	5	5
Main occupation (Specify)	Trader	Trader	Trader	Trader	Wholesaler	Trader	Trader	Whole saler	Trader	Whole saler	Food vendor	Trader	Trader	Trader	Whole saler	Trader	1	Trader
Level of trading	Urban market	Urban market	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	local rural, urban markets	Urban markets	Whole saler	Urban	1,2 and 3	Urban	Urban	Urbanan
Crops person is dealing with (indicate main crops or products)	Fresh cassava	Fresh cassava	Cassava roots	Fresh cassava	Fresh cassava	Fresh roots	Fresh roots	Fresh roots	Fresh roots	Fresh roots	Boiled roots	Fresh roots	Fresh roots	Fresh roots	Fresh roots	Fresh roots	Fresh roots	Fresh roots

5.1 The cassava value chain

Results show that traders in the cities obtain cassava from other districts whereas those from urban and rural markets in Luweero and Apac obtain the roots within those distritcts. For example, traders from Gayaza, Kalerwe and Kasangati markets which are in the city obtain cassava roots from Hoima, Kigumba, Luweero, Mubende and Kibale districts. More over traders from Apac and Luweero obtain cassava roots from within the districts. Cities have little arable land from growing cassava that traders have to source it in major cassava growing districts. Apac and Luweero districts have arable land and thus cassava can be grown and obtained from there.

Table 33. Occupation of trader, major locations where the crop is grown and marketed according to the traders interviewed

Occupation of respondent /Market	Level of marketing	Major locations where the crop is grown	Major locations where the crop is marketed
Trader, Gayaza market	Urban Market	Kibaale, Mubende, Hoima, Kiboga	Gayaza
Trader, Gayaza market	Urban Market	Kiboga, Kibaale and Mubende	Gayaza
Trader, Gayaza market	Urban Market	Kibaale, Mubende, Kigumba	Gayaza
Trader, Kasangati market	Urban Market	Kibaale, Mubende,	Kasangati
Wholesaler, Kalelwe market	Urban Market	Ngomba, Kibaale, Masindi	Kalelwe
Trader, Kalelwe market	Urban Market	Masaka, Kigumba	Kalerwe
Trader, Kalelwe market	Urban Market	Kibaale , Mubende, Gomba and Kigumba	Kalerwe
Wholesaler, Kalelwe market	Urban Market	Mubende, Kibaale, Mityana, Kigumba, Masindi, Kiboga, Luweero	Kalerwe
Trader, Kalelwe market	Urban Market	Mubende, Kisiita, Kibaale and Gombe	Kalerwe
Wholesaler, Kalelwe market	Urban Market	Mubende, Kakumiro, Kiryandongo and Hoima	Kalerwe
Restaurant and food vendor, Chegere community	Local rural markets, urban markets, up market neighbourhood and working class people	NA	NA
Trader, Apac Urban Market	Urban Market	Ngaihi, Akuli and Olelpek	Apac town
Wholesale trader, Apac Town	Wholesaler	Sawente sub county	Apac town
Trader, Luwero /Kakala Village Market	Trader	Kakala village	Luweero town
Wholesaler, Luwero /Kabakedi Parish	Local rural markets, urban markets, whole seller	Kabakedi parish	Luweero town and Kampala markets
Food vendor, Luweero town	Urban markets	NR	NR
Trader, Luwero /Kasana Market	Urban markets	Kikyusa villages	Luweero town
Trader, Luweero market	Urban markets	Kikyusa villages	Luweero town

5.1.1 Demand segments of cassava and its related attributes

Across regions, similar information was obtained from the market study regarding the main buyers of the product at community level, processing site, wholesale market and retail market. It was noted that mostly women buy cassava compared to men. Other buyers included; business people (mostly women), restaurants, the rich and the poor.

A wholesale trader from Kalerwe, Biwamuttulo revealed that, "*Mostly women buy for reselling and also take to restaurants*." Another wholesaler revealed that*, "The customer groups include; the poor, the rich, with all the religious denominations"*

Additionally, similar information was obtained from the traders concerning what the customers are demanding. These included; big roots, pink outer skin coloured roots, long slender roots, soft roots when chewed, roots with white flesh, sweet taste, non-fibrous and easy to peel roots. A wholesaler from Kalerwe market further explained that; *"People prefer pink colour (Kibaaale - Kisiita are pink), the white colour does not sell much. The pink cassava does not get spoiled quickly it remains fresh for 2 days. They also need slender long roots, sweet taste and white flesh."*

Table 34: Customer groups buying the product

Level and/or demand segment	Demographics of the customer groups / buyers of [product]	Description of what are these customers demanding
Community level:	Mostly women buy compared to men Business people (mostly women) Restaurants The poor The rich Few men/youths	Big roots Pink outer skin colour Long slender roots Soft when chewed White colour Sweet taste Fresh cassava White colour of the roots Sweet in taste Easy to peel White in colour when cut (The white colour does not sell much The pink cassava does not get spoiled quickly it remains fresh for 2 days) Good appearance White cream colour Good taste of roots Not fibrous
Processing site:	Mostly women buy compared to men Few men/youths	Appearance of the skin of the root Cream white or pinkish in colour, Big size of the root, Sweetness of the variety, White flesh Long slender medium root Easy to peel Soft when cooked Not fibrous
Wholesale market:	Mostly women buy compared to men Mostly women, men and youths	Not fibrous

Level and/or demand segment	Demographics of the customer groups / buyers of [product]	Description of what are these customers demanding
Retail market :	Mostly women buy compared to men few men/youths	Appearance of the skin of the root Cream white or pinkish outer skin colour, Big size of the root, Sweetness of the variety, White flesh Long slender medium root Sweet taste Easy to peel Soft when cooked - Not fibrous

5.2 Characteristics for a high-quality crop

High-quality crop characteristics as ranked by the traders in Kampala, Apac, and Luweero districts are summarised in Table 29 below. In the Kampala region, priority was inclined towards 1. Sensory traits namely; sweet taste, soft when chewed, good appearance, white colour of the flesh and pink outer skin colour. 2. Agronomic traits; long slender roots and slightly big in size and post-harvest traits; fresh roots. In Apac region the traits included 1. Sensory related traits such as; sweet taste, and soft when chewed. 2. Processing traits such as easy to peel. Similar information was obtained from Luweero region traders regarding sensory and processing characteristics. In addition, they mentioned agronomic characteristics namely; "high yielding" and "resistant to disease".

There were various high quality crop characteristics cited by traders from the three regions with sweet taste and soft when boiled being common to all groups. Across regions, first priority was given to sweet taste. In the market men and women check for sweet taste by chewing the raw root. Skin and flesh colour are obsverved by looking physicaly at the root. Ease of peeling was evaluated by peeling the raw root. Concerning appearance and colour, a male trader from Kampala region, Kalerwe market said that; *"appearance mostly depends on the customer's need. Some customers prefer pink outer skin colour to buy while others prefer white cream colour to buy*." Indeed a male trader from Apac region said, "*In all the categories they are interested in appearance of the skin of the root ; cream white or pinkish in colour, big size of the root, sweetness of the variety, cut and check the inner colour of the root, it should be white in most cases*."

Table 35: Characteristics of a high-quality crop

Rank	Characteristic	Indicators used for ranking crop characteristics and demand segment they are important for
KAMPALA REGION		
1	Sweet taste	By chewing in the mouth
2	Pink outer skin colour	By looking at the whole root
3	Soft when chewed	By chewing in the mouth
4	Easy to peel	By peeling the root with a knife
5	Good appearance	By looking at the whole root
6	Long slender roots	By looking at the whole root
7	White colour of flesh	Cutting and checking the inner colour of the root.
8	High quality cassava	By looking at the whole root
9	Fresh roots	By looking at the whole root
10	Long and slightly big in size	By looking at the whole root
11	Slender roots	By looking at the whole root
APAC REGION		
1	Sweet taste	By chewing in the mouth
1	Soft when boiled	By chewing in the mouth
3	Easy to peel	By peeling the root with a knife

LUWEERO REGION		
Rank	Characteristic	Indicators used for ranking crop characteristics and demand segment they are important for
1	Sweet taste	By chewing in the mouth
1	Easy to peel	By peeling the root with a knife
3	Soft when boiled	
4	Pink and white skin colour	By looking at the whole root
5	High yielding	Many long slender roots
6	Resistant to disease	No rots
7	Soft and Mealy	By chewing the boiled root

5.3 Proportion of the crop consumed and sold

Results showed that traders sold a high proportion (up to 80%) of the crop to household consumers in urban areas for both Kampala and Luweero region. This was followed by restaurants in Kampala region. In Luweero region house hold consumption in urban areas was followed by consumption by at homes in the rural areas. For Apac region, a higher proportion of the crop was sold to restaurants followed by household consumers in urban areas/cities. The lowest proportion of the crop sold by traders in Kampala and Luweero was to institutions such as schools and hosptitals.

Table 36: Proportion (%) of the crop sold by farmers

Customer groups	KAMPALA Percentage (%)	APAC Percentage (%)	LUWEERO Percentage (%)
	Sold	Sold	
Rural consumers – farmers keeping the crop for home consumption	NR	NR	NR
Rural consumers – purchasing the crop for home consumption	10%- 15%	5%-10%	30%
Household consumers in towns	NR	10%	10%-20%
Household consumers in urban areas / cities	30%-80%	20%	50%
Institutions such as hospitals or schools	2% -20%	5%-10%	NR
Restaurants	10%- 20%	30%-40%	NR
Food vendors	8%-20%	10%-20%	NR
Others (specify)	NR	NR	NR

NR= no response

5.4 Consumption patterns of different consumer groups

All traders across the regions were in agreement that the consumption patterns differed among consumer groups. In Luweero region for example, the majority of the traders revealed that cassava is consumed more in urban areas compared to rural areas and in different forms. A female food vendor at Luweero market attributed this to the fact that urban people have money to buy food. To ellaborate further, a female wholesaler from Luweero market said*;*

"The rural farmers have cassava in their gardens and can eat alternative crops like sweet potatoes, matooke and posho to substitute it."

Similar responses were obtained from Kampala region traders. These also added that consumers consume the product in different forms such as boiling, frying chips, pounding after boiling and roasting. In Apac town a responded said that, "The rural people consume more because most of them don't buy fresh roots, they just harvest from their gardens while the urban people buy mostly and purchase enough for their entire family."

Table 37 Consumption patterns of different consumer groups

Occupation of respondent /Market	Rural areas	Urban areas	Forms of consumption
Male wholesaler, Apac town	The rural people consume more because most of them don't buy fresh roots they just harvest from their gardens	The urban people buy mostly and purchase enough for their entire family.	
Male trader, Luweero market	Rural people have alternative crops to eat so they consume less compared to urban people.		
Female wholesaler, Luweero town	The rural farmers have cassava in their gardens and can eat alternative crops like sweet potatoes, matooke and posho to substitute it	Cassava is consumed more in urban areas compared to rural areas in different forms	
Female market food vendor, Luweero town		Urban people consume more compared to rural people because they have money to buy food.	
Female market trader, Luweero town	Rural people consume more compared to urban people	Urban people have alternative crops like matooke, rice, posho and chapati	
Female market trader, Luweero town		Urban customers eat more of fresh cassava than rural people	
Female trader, Gayaza market		urban consumers eat a lot of cassava because they can afford to buy.	They almost have the same pattern because all of them buy fresh cassava in the market. They prefer fresh cassava to buy and they boil mostly for urban consumers. Fry in chips mostly
Female trader, Gayaza market			They have different patterns of consumption; boiling, frying chips, Pounding after boiling
Female trader, Kasangati market			They have different consumption patterns. Some boil, fry or roast
Female trader, Kalerwe market		They don't have the same consumption patterns More people consume in urban areas	
Male trader, Kalerwe market			They don't have the same consumption patterns; 60% boil, 40% fry
Male wholesaler, Kalerwe market			No, Majority boil and few fry or roast and is done mostly in urban centres
Female trader, Kalerwe market		No they have different patterns, urban people consume more of the fresh roots	
Male wholesaler, Kalerwe market		No; they don't have the same consumption patterns, urban consumers consume more since they have money to buy food	

5.5 Cassava varieties generally preferred

There were notable similarities and differences in varieties demanded and their priority to people from Kampala, Luweero and Apac regions. Nyaraboke was of high priority in Kampala and Luweero regions, and was given second priority in Apac region. Bao was ranked first in Apac region. While Gwaranda and Kisiita were ranked second and third respectively in Kampala region, NASE 14 and Mwanje were ranked second and third in Luweero region. It is noteworthy that varieties common to the three regions included NASE 14 and Nyaraboke, while Bukalasa and NASE 13 were common to Kampala and Luweero regions.

Table 38 Varieties/types of cassava demanded

Variety / types of the crop demanded	Order of importance			Reasons why this variety is demanded
	Kampala	Apac	Luweero	
Nase 14	4	3	2	NR
Bao		1		Bao variety produces more alcohol than the rest so brewers prefer it
Bukalasa	6		7	NR
Gwaranda	2			NR
Kisiita	3			NR
Mwanje			3	NR
Nanchinga	7			NR
Nase 13	8		7	NR
Nyaraboke	1	2	1	NR
Dero Dero		2		NR
Kawuki			4	
Kazza			4	
Kwatamumpale	11			
Narocas 1			4	
TME14	5			
Fumba chai	12			
Kayinja	8			
Kibaale	8			
Semitende	13			

5.6 Quantities of cassava and boiled cassava traded

From the market study, quantities of fresh cassava traded by traders in Kampala, Apac, and Luweero regions ranged from 0.13 to 2.5 tonnes; 0.05 to 3.9 tonnes and 0.065 to 3.12 tonnes, respectively per day (Table 39). There was much variation regarding quantities of fresh cassava traded across regions as some traders sold quantities as low as 0.05 tonnes while others sold quantities as high as 3.9 tonnes of fresh cassava daily. It is noteworthy that the highest sales were recorded in Apac region. Apart from the fresh product, the only information obtained concerning the processed products revealed 50 plates of boiled product sold daily by a female food vendor in Luweero town.

There were notable variations in quantities traded daily by farmers across regions during the different seasons (Table 40). In Apac region, for example, daily throughput of cassavawas generally higher during the festive seasons. This was closely followed by the wet seasons. In contrast, although 40% of Kampala region traders said there was no change in daily throughput of the product, 40% of the traders revealed sales to be higher in wet seasons, while only 20% revealed daily throughput to be higher in dry seasons. Concerning wet seasons, a female trader from Gayaza market said, "*They buy little during dry season and buy more during wet season because the soils are soft and harvesting is easy.*"

However, two male traders from Kalerwe market accounted higher sales during dry seasons to *scarcity of other crops during the dry season*. It is noteworthy, that higher sales were revealed to be

achieved in wet seasons in Luweero region, followed by festive seasons. Across regions, sales and corresponding prices were lower during the planting season due to presence of alternative crops such as matooke; and school fees time due to scarcity of money (Male trader, Kalerwe market).

Table 39: Quantities of cassava traded (tonnes) daily as fresh and processed by region

	KAMPALA Quantities traded (tonnes)									APAC Quantities traded (tonnes)		LUWEERO Quantities traded (tonnes)				
Fresh crop	1.875	1.875	0.13	0.26	1.2	0.065	2.5	0.26-0.65	2.5	0.13	2.6- 3.9	0.13	3.12	0.065		0.13
Processed [product]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			50 plates	
Processed [other products]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR				

Table 40 Daily throughput/amount of cassava traded daily (kg or tonnes) in selectedMarkets

KAMPALA			APAC			LUWEERO		
Occupation of respondent /Market	**Part of the year**	**Quantities of crop (tonnes) (tonnes)**	**Occupation of respondent /Market**	**Part of the year**	**Quantities of crop (tonnes)**	**Occupation of respondent /Market**	**Part of the year**	**Quantities of crop (tonnes)**
Trader, Kalerwe market	Wet season	0.26-0.39 tonnes	Market trader, Apac town	Wet season	0.26 tonnes	Market trader, Luweero town	Wet season	0.195 tonnes
	Dry season	0.13 tonnes		Dry season	0.13 tonnes		Dry season	0.065 tonnes
	Planting time	0.13 tonnes		Planting time	0.065 tonnes		Planting time	0.065 tonnes
	Festive periods			Festive periods	0.39 tonnes		Festive periods	0.26 tonnes
	Time of school fees	0.13 tonnes		Time of school fees	0.13 tonnes		Time of school fees	0.065 tonnes
Trader, Kalerwe market	Wet season	0.065 tonnes	Market wholesaler, Apac town	Wet season	3.9 tonnes	Market wholesaler, Luweero town	Wet season	3.12 tonnes
	Dry season	0.065 tonnes		Dry season	2.6 tonnes		Dry season	1.56 tonnes
	Planting time	0.065 tonnes		Planting time	2.6 tonnes		Planting time	1.56 tonnes
	Festive periods	0.065 tonnes		Festive periods	3.9 tonnes		Festive periods	0.78 tonnes
	Time of school fees	0.065 tonnes		Time of school fees	2.6 tonnes		Time of school fees	1.56 tonnes

KAMPALA			APAC			LUWEERO		
Wholesaler, Kalerwe Market	Wet season	0.5 tonnes				Market trader, Luweero town	Wet season	0.13 tonnes
	Dry season	1.25 tonnes					Dry season	0.065 tonnes
	Planting time	0.5 tonnes					Planting time	0.13 tonnes
	Festive periods	0.25 tonnes					Festive periods	0.26 tonnes
	Time of school fees	NR					Time of school fees	0.26 tonnes
Trader, Kalerwe market	Wet season	0.65 tonnes				Market trader, Luweero town	Wet season	0.26 tonnes
	Dry season	0.26 tonnes					Dry season	0.13 tonnes
	Planting time	NR					Planting time	0.13 tonnes
	Festive periods	0.26 tonnes					Festive periods	0.065 tonnes
	Time of school fees	NR					Time of school fees	0.065 tonnes
Wholesaler, Kalerwe market	Wet season	0.625 tonnes						
	Dry season	1.125 tonnes						
	Planting time	0.5 tonnes						
	Festive periods	NR%						
	Time of school fees	0.25 tonnes						
Trader, Gayaza market	Wet seasons	2.5 tonnes						
	Dry seasons	1.875 tonnes						
Trader, Gayaza market	All seasons	Same amount sold daily						
Trader, Gayaza market	All seasons	0.13 tonnes (Same amount sold daily)						

KAMPALA			APAC			LUWEERO		
Trader, Kasangati market	All seasons	0.26 tonnes (same amount sold daily)						
Trader, Kalerwe market	All seasons	sells more during wet season and times of school fees sells less during dry season and festival period						

5.7 Transport, storage, and means of selling cassava

There were varied responses among respondents across the regions regarding transportation of fresh cassava. Overall, information obtained reveals trucks, bicycles and motorcycles as the major modes of transportation of fresh cassava. Apart from two female traders that used boda bodas, information obtained from the Kampala region traders revealed that the majority used trucks for transportation of fresh roots. Apac town traders revealed that bicycles are used to transport fresh cassava to the selling point, but a male trader from Apac town also added that at times they hire motorcycles which are expensive. Although majority of Luweero market traders said bicycles and motorcycles are used to transport fresh cassava to Luwero markets, one wholesaler from the same region reported use of trucks.

Concerning storage, it was obtained from traders across regions that fresh cassava is stored in the market. Female traders from Gayaza, Kasangati and Kalerwe markets in Kampala region revealed that fresh cassava in the market is covered with mats, sweet potato vines, papyrus, canvas, and cassava leaves. Besides that, Apac town male traders and wholesalers said that they keep unsold bags in stores some of which are hired on a monthly basis. Varied responses were obtained from Luweero town traders in that although 40% of the traders from Luweero town revealed that storage is done within the market area since the traders hire stores on a monthly basis, 40% said fresh roots are stored and heaped under the shade in market places. Additionally, a female food vendor from Luweero town said that ; *"fresh roots are stored underground. "*

Important characteristics during transportation and storage that might affect the end-product were similar for Luweero and Apac regions, and different for Kampala region. Traders reported that immediately after harvesting, fresh cassava roots should be transported and sold that very day to maintain the quality after boiling. They said if the roots stay overnight, the quality in terms of taste reduces and customers complain. This is further explained in a comment below:

"If the cassava fresh roots are harvested from the garden, it should be transported direct to traders who eventually sell it to the consumers that very day to maintain the quality of roots boiled for a meal. If the roots stay to the next day without being sold, the quality of cassava will not taste nice and customers would complain. The roots which over stay without sale, can be processed to dry chips to make cassava flour which is used to make pan cakes or cassava bread (Atapa/Kalo)." (Male wholesaler, Apac town)

Kampala region traders revealed *"transportation during day", "exposure to sunshine", "overstay of fresh cassava roots in transit and storage" and "poor handling" as important characteristics that lead to spoilage and reduction in quality of fresh roots resulting in poor quality of boiled cassava. To avoid this, Kampala region traders said that, "it should be transported at night to maintain the fresh quality of roots. It should be covered with sweet potato vines, papyrus, canvas, cassava leaves in the market to avoid spoiling the cassava"* (Female trader, Kasangati market and female wholesaler, Kalerwe market)

Table 41 Means of transportation, dsaily throughput/amount traded daily (kg or tonnes) in selected markets

Occupation, Name of town/community	Means			Important characteristics that might affect the end-product
	Transportation	Storage	Means and forms of sales	
Trader, Gayaza market	Trucks	Markets	Fresh form	1. If the cassava is transported during day, fresh roots can be spoiled. 2. If the fresh roots stay more than 2 days before sell, it can be spoiled. 3. Fresh cassava roots should be covered all the time in the market to provide cool environment
Trader, Gayaza market	Trucks	Markets	Fresh form	Fresh roots are transported at night and bought early morning from 5am to 6pm every day. For sale, cassava should not go beyond 2 days. It gets spoiled.
Trader, Gayaza market	Boda boda	Stored in the market and covered with potato vines	Fresh form	To avoid transporting during day time, Transport at night keeps roots fresh.
Trader, Kasangati market	Boda boda	Markets; covered with mats / sweet potato vines	Fresh form	Fresh cassava should be transported at night Fresh cassava should be covered with mats / sweet potato vines to guard against sunshine
Wholesaler, Kalerwe market	Trucks	Market, they are covered with Papayrus/ Canvas/ cassava leaves in the market	fresh form	It should be transported at night to maintain the fresh quality of roots. They are covered with Papayrus/ Canvas/ cassava leaves in the market to avoid spoiling the cassava
Trader, Kalerwe market	Trucks	Markets	Fresh form	If the fresh roots are not sold in the market, it deteriorates. Transportation is done at night in Kalerwe market.
Trader, Kalerwe market	Trucks	Markets	Fresh form	If cassava roots are left exposed under sunshine, it gets spoilt. If the fresh roots go beyond 2 days if no sold, its spoilt
Wholesaler, Kalerwe market	Trucks	Markets	Fresh form	If its exposed under sunshine during day time, it can easily get spoilt. Transportation to selling places is always done at night to maintain the freshness of the root during transit
Trader, Kalerwe market	Trucks	Market	Fresh form	Handling the crop from the field to market. Trucks are used to ferry at night in most cases. This method miniises fresh roots getting spoilt
Wholesaler, Kalerwe market	Trucks	Markets	Fresh form	If cassava over stays in transit/ market, it will be spoilt. Transporting long distances is recommended for maintaining the fresh quality of roots

Occupation, Name of town/community	Means			Important characteristics that might affect the end-product
	Transportation	Storage	Means and forms of sales	
Trader, Apac town	They use mostly bicycles but at times hire motorcycles which are expensive.	Storage is done within the market area since they hire stores in a monthly basis.	Fresh form	If the cassava fresh roots are harvested from the garden, it should be transported direct to customers (traders) who eventually sell it to the customers (consumers) that very day to maintain the quality of roots boiled for a meal. If the roots stay to the next day without being sold, the quality of cassava will not tasted nice and customers would complain. The roots which over stay without sale, can be processed to dry chips to make cassava flour to make pan cakes or cassava bread (Atapa/Kalo).
Wholesaler, Apac town	Bicycles are used to transport fresh cassava to the selling point.	They have stores to store bags which are not sold.	Fresh roots	Immediately after harvesting, fresh cassava roots should transported and sold that very day to maintain the quality of it after boiling. If the roots stay overnight the quality in terms of taste reduces.
Trader, Luweero town	They use mostly bicycles but at times hire motorcycles.	Storage is done within the market area since the traders hire stores in a monthly basis.	Fresh form	If the cassava fresh roots are harvested from the garden, it should be transported direct to customers (traders) who eventually sell it to the customers (consumers) that very day to maintain the quality of roots boiled for a meal. If the roots stay to the next day without being sold, the quality of cassava will not tasted nice and customers would complain. The roots which over stay without sale, can be processed to dry chips to make cassava flour to make pan cakes or cassava bread (Atapa/Kalo).
Wholesaler, Luweero town	Trucks	Storage is done within the market area since the traders hire stores in a monthly basis.	Fresh form	The cassava are sold and transported that very day for selling to other customers in Luwero town and Kampala markets
Food vendor, Luweero town	NA	Fresh roots are stored underground	Processed form i.e boiled cassava	
Trader, Luweero town	Bicycles and motorcycles are used to transport fresh cassava to Luwero markets	Stored and heaped under the shade in markets places	Fresh form	NR
Trader, Luweero town	Bicycles and motorcycles are used to transport fresh cassava to Luwero markets	Stored and heaped under the shade in markets places	Fresh form	If the cassava roots stay more than a day before its consumed the quality will deteriorate. Alternative sale of other crops reduces the demand of the sell of fresh roots.

5.8 Drivers of change in demand for cassava in the market

Generally, across the regions, the majority of responses concerning demand were based on raw product characteristics and quality. The minority revealed demand to vary due to prices of fresh cassava roots and mode of serving of boiled cassava. From the responses, for example, product characteristics that were demanded more included; sensory (pink skin colour, white flesh, soft when chewed, mealy, nice aroma and sweet taste), agronomic (long slender roots) and processing (easy to peel) characteristics. This is further elaborated below;

"*If the outer skin color of roots are pink, white in colour, soft, sweet in taste and they are long slender roots, they are demanded more." (Female trader, Gayaza market)*

A wholesaler from Kalerwe market also revealed that, *"If the variety is not good, the demand is low; like for varieties which are ratooned, the taste is somehow bitter and they are hard."*

Besides product characteristics, male traders from Apac and Luweero markets said that reducing the price per heap sold or increasing the heap size will lead to increased demand for fresh cassava. Responses from a female food vendor from Apac town revealed ***"****Serving food at a specific given time, that is break time only, taste of the product, texture, and flavor*," as factors leading to increased demand of the boiled product, while a female food vendor from Luweero revealed that steamed cassava is sold with accompaniment of emolokony as a sauce which increases the demand for cassava since customers like emolokony very much.

From the market study, information obtained from traders concerning changes as far as the major characteristics of the crop or end- product are concerned revealed that people are not interested in buying if the variety is bitter, watery, infected by CBSD and hard to chew/ over mature (male wholesaler, Kalerwe market). On the account of bad characteristics, 2 traders and 1 wholesaler from Kasangati and Kalerwe markets revealed that people opt for alternative crops like matooke and sweet potatoes. Other undesirable characteristics that led to lower prices included; if taste is not sweet, rottenness, and the variety not making good chips. To elaborate more, a female trader, Luweero market said,

"*The cassava should be fresh (has not over stayed on the shelf), easy to peel and takes short to boil and very marketable to attract more customers."* A female food vendor from Luweero town said that people in the area liked sweet, soft and mealy properly steamed varieties with good flavor.

Table 42. Drivers of change in demand of cassava in the market

Drivers of change		Frequency of replies
Demand in general	If the outer skin color of roots are pink, white in colour, soft and sweet in taste and they are long slender roots, they are demanded more.(Female trader, Gayaza market)	7
	It is better to sell one bag because they also sell sweet potatoes and matooke as alternatives. If fresh cassava is not sold frequently, they add more customers. (Female trader, Gayaza market)	1
	Cassava should be sold in fresh form, sweet, soft if chewed and easy to peel. (Female trader, Kasangati market)	1
	If the variety is not good, the demand is low; like varieties which are ratooned, the taste is somehow bitter and they are hard. (wholesaler, Kalerwe market)	1
	Variety sold in the market. Cost per bag, amount sold per day. (male wholesaler, Kalerwe market)	1
	Serving food at a specific given time that is brake time only, taste of the product, texture, and flavor Cassava producing conk waragi is good for the customers. (Female food vendor, Apac town market)	
	Maintaining selling 1 bag per day cannot frustrate the trader. Selling the fresh roots after harvesting is important for the customers to like the product Reducing the price per heap sold or increasing the heap become bigger can attract many customers. (Male market trader, Apac and Luweero town markets)	2
	Reduce the price for the truck can attract demand She motivates her customers by adding more workers to harvest cassava and she pays them. (Female wholesaler, Luweero town)	
	Steamed cassava is sold with accompaniment of emolokony as a source. This will increase the demand for cassava since customers like emolokony very much. (Female food vendor, Luweero town)	
	The drivers to change in demand includes selling quality roots which are sweet in taste, soft if cooked, mealy and has aroma. (Female trader, Luweero market)	
	If the outer skin of roots are rough and fibrous, people do not buy it. If the roots have over stayed in the field or if they are infected by CBSD, people don't buy. (Female trader, Gayaza market).	1
	If the cassava is fibrous, rough outer skin colour. Hard to chew, people don't buy. (Female trader, Gayaza market).	1

Drivers of change		Frequency of replies
Changes as far as major characteristics of the crop or end-product are concerned	Lower the price of fresh roots sold Problems; They are rotten, it's not sweet in taste They don't make proper chips Bitter roots at times Does not stay long in the field 8 to 12 months and sell it. (Female trader, Gayaza market).	1
	Changes if it's bitter. They can buy sweet potatoes and matooke as alternative crops. (2 Female traders and 1 wholesaler, Kasangati market and Kalerwe market respectively)	3
	If the variety is infected, If the variety is bitter. (NAADS supply stems which will become bitter) The variety does not stay long in soils only one year and gets spoilt. The only good part is it's high yielding and tolerant to CBSD. (Male trader, Kalerwe market)	1
	If the roots over stay like 2 days, it will not taste sweet. (Female trader, Kalerwe market)	1
	If the variety is bitter, nobody is interested in buying, If it's watery, If its infected by CBSD. If it's hard to chew/ over mature. (Male Wholesaler, Kalerwe market)	1
	People in the area like sweet varieties, flavor, soft, mealy and properly steamed which customers will enjoy. (Female food vendor, Luweero town) The cassava should be short term, easy to peel and takes short to boil and very marketable to attract more customers. (Female trader, Luweero market)	

6 CONCLUSION

The study revealed that roots are the most commonly sold product of cassava. Key attributes that influence demand for cassava roots include; white flesh, sweetness, ease of peeling, softness and big size of roots. Its noteworthy that cassava roots are mostly sold for home consumption. Thus culinary attributes of cassava need to be priotised during variety development by cassava breeders. Price is one of the key drivers of change in demand of cassava roots in the market yet, time when the boiled cassava product is available influences change in demand for the product in the market. The study shows that in addition to attributes of raw cassava roots, culinary attributes are important. Therefore, researchers in WP2, 3 and 4 need to devise protocals to phenotype clones for culinary enduser traits

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