Field Scientific Report

Gendered Food Mapping on Boiled Yam in Benin

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Ethics: The activities, which led to the production of this manual, 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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CONTEXT

This report is part of the RTBfoods project WP1 outputs, essentially the activity 3 which deals with the key user-preferred quality traits for each RTB crops under study, collected through surveys with end-users. Benin research team worked on yam and cassava products and the main output from Activity 3 is to develop gendered product profile of **boiled yam and boiled cassava**. The outline of this activity (3) are to (i) understand who is producing, processing, selling and consuming the crop and product, from a gendered perspective, (ii) to understand the multiple uses and products of the crop and possible trade-offs between uses, (iii) identify the quality characteristics and descriptors by stakeholder group and demand segment and (iv) understand how gender influences preferences and prioritisation for characteristics. In short, this report focuses only on yam tuber and aims to provide information on socio-economic context and product preference, especially on quality characteristics of raw yam and boiled yam, prioritised by gender. It deals with the survey carried out on boiled yam in 8 Beninese rural communities. This survey was supported by questionnaires containing open questions addressing demand from a range of users, such as producers, processors, retailers and consumers along the food chain by checking different aspects: market study, gender, quality criteria (raw material and final product) and processability. Following, data analyses focused mainly on social segment and products preference (raw and boiled).

METHODOLOGY

Survey was carried out on yam and boiled yam based on the principle of triangulation of data collection tools and informants' sources in the food chain with eight (8) rural communities of central Benin, named District of DASSA-ZOUME and District of DJIDJA, two production and consumption zones of yam (Photo 1). For this purpose and for Activity 3, four sub-activities were undertaken that integrated key informant group interviews (KII) with community leaders, sex-disaggregated Focus Group Discussions (FGD) with people who produce, process and consume the boiled yam, individual interviews (II) with community members and market interviews (MI) with key individuals or groups involved in marketing and trading activities. Accordingly, 16 focus group discussion with men (8) and women (8) and 80 individual interviews with community members were undertaken. Individual interview with eight market and eight community leaders were also undertaken. As far as qualitative data are concerned, verbatim transcription in excel were realized and then, descriptive statistics, mainly frequency was calculated. Based on triangulation, the robustness of citations and characteristics were checked by revisiting the similarity/synonymy between verbatim words used by respondents or transcribed by different interviewers (variation in vocabulary). Important and robust characteristics were selected and prioritirized according to the citations' weighting. Thus, the number of citations of each important quality characteristic was multiplied by a weight, depending on the prioritization done by the respondents: by 3 when cited as the 1st priority, by 2 when cited as the the second priority, and by 1 when cited as the third priority by the respondents. The sum of the counts (number of citations multiplied by the weights) was calculated. If this sum is more than 10, the quality criterion is considered in definition of product profile.

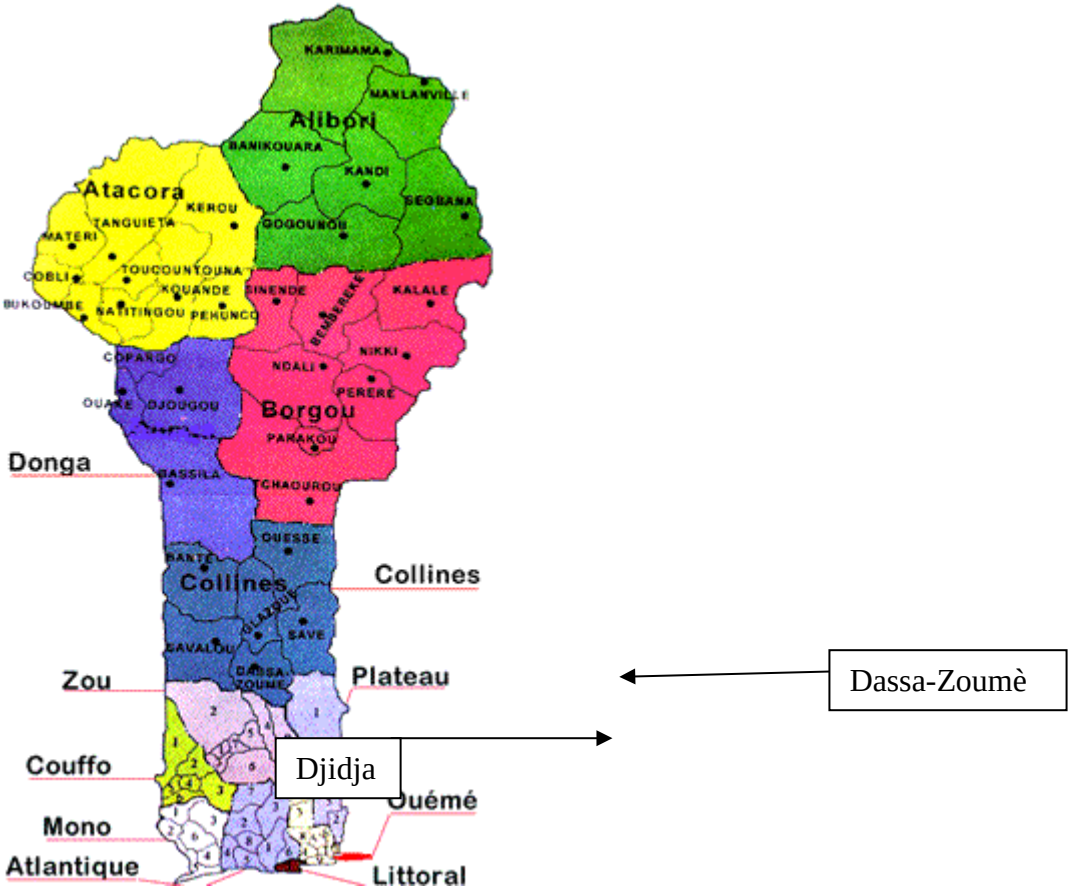

Illustration 1: Survey areas

RESULTS

1 FINDINGS: SOCIO-ECONOMIC CONTEXTAND PRODUCT PREFERENCES (FSA-UAC)

1.1 Social segmentation and livelihoods

What are the different groups of people in your community? (Probe gender social segmentation). What is the relative proportion of the community population in each of the categories? KII Q2

Table 1: Social segments (KII Q2)

Community name	Social segments (%)
Dassa, Dassa centre	Ethnicity: Idaatcha (60%), Others (40%); Wealth: Poor: 80% ; Very poor: 20% Sex: Men: 40%, Women: 60%
Dassa, Kpingni	Ethnicity: Mahi monso (100%) Wealth: Rich: 20%; Moderately rich: 20% ; Poor: 30%; Very poor: 30% Sex: Men: 40%, Women: 60%

Community name	Social segments (%)
Dassa, Lema	Ethnicity: Idaatcha (20%), Sola (80%) Wealth: not indicated Sex: Men: 40%, Women: 60%
Dassa, Igoho	Ethnicity: Idaatcha (100%) Wealth: Poor: 50% ; Very poor: 50%; rich:none (0%) Sex: Men: 30%, Women: 70%
Djidja, Djidja Centre	Ethnicity: Fon (100%) Wealth: Rich: 20 %; Moderately rich: 10% ; Poor: 40%; Very poor: 30% Sex: Men: 40%, Women: 60%
Djidja, Zinkanmè	Ethnicity: Mahi (10%), Fon (70%), Yoruba (10%); Adja (10%) Wealth: Rich: 50% ; Moderately rich: 30% ; Poor: 20% ; Very poor: 0% Sex: Men: 40%, Women: 60%
Djidja, Lalo	Ethnicity: Fon (100%) Wealth: Moderately rich: 50% ; Poor: 25% ; Very poor: 25% Sex: Men: 40%, Women: 60%
Djidja, Dan Centre	Ethnicity: Fon (100%) Wealth: Poor: 80 %; Very poor: 20% Sex: Men: 40%, Women: 60%

The communities interviewed were very diverse: differences between and within communities were evidenced as far as wealth and ethinicity are concerned. Thus, key informant interviews revealed that most of the communities distinguished differences in their community by wealth status and ethnicity. The ethnical group Fon was dominant in the four villages of Djidja while at the villages of Dassa, heterogeneity was observed. Indeed, three ethnic groups (Idaatcha, Mahi-monso and Sola) predominated at Dassa while only one (Fon) at Djidja. In both regions, different categories of wealth were cited and distributed among poor and rich people, with rich status more cited at Djidja. In the centre of both municipalities (DASSA and DJIDJA), people are distributed in two wealth categories, poor and very poor as revealed by informants. This was not expected since in the centre of the municipality, we should have rich people. This information indicates the relative appreciation of wealth status in link with the communities: so, what means "poor" in the centre could be "rich" at villages.

What are the livelihood activities of people in the community involving food crops? How important are these activities for people in the community? FGD Q2

Table 2: Livelihood activities (FGD Q2)

Community name	Livelihood activities and (people they are important for)	
	Men Focus Group	**Women Focus Group**
Djidja, Zinkanmè	Yam and cassava (**men**), market gardening (**women**), field works (mostly idaatcha adults "aged more than 50 years") and some peulhs in a lesser extent	Market gardening (women), food crops (men), vegetables (married women), yam (fon & yoruba), tomatoes and pepper (adja)
Djidja, Dan centre	Field works (men, most of the time adults), sewing, trading (women, most of the time adults)	Field works (everybody especially adults), land/plot purchasing and building (wealthy and less wealthy)

Community name	Livelihood activities and (people they are important for)	
	Men Focus Group	**Women Focus Group**
Djidja, Lalo	Field works (everybody), market gardening (women), cotton (young people), yam (adults)	Field works (all social segments)
Djidja, Djidja centre	Market gardening (women), cotton (young people), maize, cassava, yam (adults), field works (fons), animal husbandry (peulhs), shop for trade (adjas)	Crops processing (women), fresh harvest sale (men), field works (young people because they have strength), market gardening (adjas), cassava and gari processing (mahi), yam (idaatcha and fon), maize and sorghum (peulhs)
Dassa, Kpingni	Field works (all social segments)	Yam (most of the time adults more than young people, idaatcha women)
Dassa, Dassa centre	Field works (mostly adults), Field work labour (poor young people)	Market gardening, cassava (women), maize (mostly idaatcha), yam (mostly lokpa)
Dassa, Lema	Maize and yam (men), market gardening (women), yam (adults), cotton (young people), animal husbandry, sorghum (peulhs), market gardening (adjas), yam (mahis), cotton, maize, cassava, yam (fons)	Production of food crops such as millet, cassava, maize and yam (women) marketing, “Akassa” seller

Overall, farming was the core livelihood activity for all communities in the sample, and included all household members, regardless of gender. However, it was never cited that women can plant coton. The women were involved especially in the market gardening while the cotton is grown by the young men. Indeed, the market gardening is made primarily for domestic consumption and the cotton growing requires physical forces. The animal husbandry and sorghum crops are both activities specific to an ethnic group e.g. “peulhs”.

In your community, imagine there are four different wealth categories, wealthy, moderate, poor, and very poor. How would you describe the differences between the groups in your community? FGD Q3

Table 3: Wealth categories (FGD Q3)

Community name	Wealth categories, meaning and descrption (FGDs)	
	Men Focus Group	**Women Focus Group**
Djidja, Zinkanmè	**Very rich (Dokounon blidayi)**: has a mean of travel, offers drinks to people, does not attend any meeting **Rich (Dokounon)**: has a motorcycle, a cement house, the kids go to school, **Poo**r **(Wamon-non=** *he works and earns a little"money"***):** no motorbike, clay house, does field work, children go to school	**Very rich (Dokounon)**: sending children to private school, well dressed children, they waste food, have houses and cars **Moderately rich (Minvo=***one is weathy***)**: feel little confortable, children attend to quality school. They have motorbike, orchards, buy cows. Children don't waste food **Moderately poor (Wamon-non=idem)**: have bicycle and/or motorbike, earn little money by working. **Very poor (Yato-non=** *father of pain/suffering***)**: are eternal labourers, need financial help to eat.
Djidja, Dan centre	**Very rich (Dokounon/ Akouenon=** *holder/father of richnesss/money***)**: big and nice house, many plots, cars, teak fields, children study well and become very important personnality in the country **Moderately rich (Dokounon/ Akouenon)**: buys motorbike, support the family without help from anybody, children go to school without difficulties, **Poor (Wamamon-non):** he does nothing to get out of this situation, works enough without satisfation, has difficulties to support himself and his family	**Very rich (Dokounon/ Akouenon)**: clean, impressive, have nice cars, children attend nice schools **Poor (Wamamonnon=** *"he works everyday but does not get anything/ enough money***)**: he has neither motorbike nor car, no reward through his efforts **Very poor (Gbèdonan-non=***wretched eg Nothing goes well***)**: doesn't eat without any gift, he's always workman, local labourer
Djidja, Lalo	**Moderately rich (Dokounon)**: eats with satiety, doesn't go into debt, builds his house out of bricks **Poor (Wamon-non=** *he works and earns a little"money"***)**: can't find food, children go a little bit to school, clay house	**Very rich & rich (Dokounon)**: clean, have well built houses, cars, children attend good schools
Djidja, Djidja centre	**Very rich (Dokounon blidayi=***A big holder of richness)*: has a transport mean such as car and motorcycles, has lands and houses everywhere **Rich (Dokounon)**: has a transport mean and is able to support himself without the help of anyone **Poor (Wamon-non=** *he works and earns a little"money"***)**: built a clay house and struggled to support his family, **Very poor (Yato-non=** *father of pain/suffering***)**: has no home, no food and lives with family.	**Very rich (Dokounon=***holder/father of richnesss/wealth***)**: dress well and are able to support their families, **Rich (Dokounon)**: beautiful house, dresses well, has a car, has the necessary to maintain/support his family **Poor (Wamon-non=** *he works and earns a little"money"***)**: has a motorcycle and a house in poor condition, **Very Poor (Yato-non=** *father of pain/suffering***)**: has difficulties to eat, to satisfy his needs and those of his children who do not go to school.

Community name	Wealth categories, meaning and descrption (FGDs)	
	Men Focus Group	**Women Focus Group**
Dassa, Igoho	**Very rich (Olowo)**: able to make loans to people, uses casual labour for field work and buys cars, **Rich (Olowo)**: tries to take care of himself, **Poor & very poor (Adjiya & Adjiya kpatakpata=***you suffer/to suffer the pains of hell***)**: take trouble to eat despite their efforts.	**Very rich (Olowo)**: build with quality material, send his children up to university **Moderately rich (Olide)**: clay house, children go to school, children are obliged to go to Nigeria to improve their living conditions **Poor (Adjiya=** *you suffer***)**: no transport means, have to be helped for supporting children schooling **Very poor (Adjiya kpatakpata=***/to suffer the pains of hell***)**: has a precarious habitat or live with someone.
Dassa, Kpingni	**Poor (Wamanmon-non=** *"he works everyday but does not get anything/ enough money***)**: precarious habitat, can't buy a motorbike, children go little bit to school **Very poor (Yato-non)**: unable to feed himself, have to be helped by others, has difficulty to provide his children with schooling	**Very rich (Dokounon)**: able to make loans to people, uses casual labour for field work, buys cars, **Rich (Enoeton)**: tries to take care of himself, **Poor & very poor (Wamamonnon & Yatonon)**: take trouble to eat despite their efforts.
Dassa, Dassa centre	**Very rich (Olowo)**: varies his feeding/foods, has transport means, buildings, many wifes and mistresses **Rich (Olowo liba)**: has many wifes, has monopoly of speech in a conversation, many plots of lands, buildings and cars, is recognized through his dressing **Poor (Wamanmon-non=** *"he works everyday but does not get anything/ enough money***)**: straw houses, difficulties to support his family **Very poor (Yato-non=** *father of pain/suffering***)**: is recognized through his appearance and his bad dressing, children have difficulties to go school.	**Rich (Olowo)**: his appearance and his house show his well-being **Poor (Adjiya))**: lives in difficulty despite his work, children cannot go to university but go on apprenticeship **Very poor:** works in the farm of other people as supplier of labour, the children do not go to school.
Dassa, Lema	**Very rich (Olowo)**: owns foods, motorbikes, cars, tractors, livestock, **Rich (Olowo kekere)**: can afford a motorcycle, able to satisfy his needs, **Poor (Adjiya)**: he manages but cannot meet all the needs of the family, **Very poor (Adjiya boukeke)**: unable to send children to school, eat with difficulty.	**Rich (Olowo kekere)**: own goods and lands with easiness **Very poor (Adjiya boukeke)**: never has what to eat, he is dirty whatever the events, he weeds a year round (365 days/365) for other people

The community members' interviews revealed strong differences in how they defined wealth categories in the community, with most of people citing 'very poor, poor, moderate rich, very rich'. Some communities did not reveal any difference between very poor and poor and between very rich and moderate rich. In general, Djidja communities have a higher socio economic statuts than Dassa communities according to their description of wealth categories. Thus, the definition of rich in dassa can have the similarities with the definition of poor in Djidja. Indeed, some communities of Dassa, do not have school, material goods (car, building etc.) and the wealth is valued by the size of lands.

These differences are also perceived in the terminology. For instance, "wamanmonon" can denote the "moderate rich" among the communities Dassa and "poor" for the Djidja communities.

1.1.1 Farming practices and social segmentation

Are there differences in the ways in which people farm in your community? FGD Q 4.1
Are these differences related to different groups of people in your community? Probe social segments. FGD Q4.2

Table 4: Farming practices (FGD Q4)

Community name	Farming pratices	
	Men Focus Group	**Women Focus Group**
Djidja, Zinkanmè	A training of PADID, PROCOTON agents do not recommend crops association. The only existing collective plot was temporarily given to the women.	Yam is grown by ethnic group fon in the village Zinkamin..
Djidja, Dan centre	Each farmer cultivates according to his financial capacities and the number of children. Women do market gardening; they not have the physical strength to cultivate much. Crop in association such as groundnuts and maize or cassava and maize are done.	Women growing beans, chili and okra for money.
Djidja, Lalo	Associated crops such as cassava maize or groundnut corn are done. Women achieve market gardening	Women have the obligation to help them first in their fields before going to work in their own field in the evening.
Djidja, Djidja centre	The ways of doing things are different and also it depends on the experience, the know-how and the ways taught by the seniors. The associated crops are cassava- maize, maize- groundnut.	Yam cultivation requires more strength; thus, men grow more (5 times more plots) than women. Women make the same cultures as men. It is the area planted that differs.
Dassa, Igoho	Yam is not suitable for muddy or sandy soils. Yam is grown alone; it is not associated with any other crop. It is the same for all crops for better yield. Everyone has his plot that he cultivates according to his strength and his means.	There are no collective plots in the couple; Husbands take all the good lands and the biggest because *they do not want their wives to exceed them financially*. Land is also given according to women's ability to cultivate/grow.
Dassa, Kpingni	Each farmer has land according to his physical strength and financial means. Family land is sometimes given to those who need it.	There is only one association with a collective plot. Every woman cultivates according to her ability.
Dassa, Dassa centre	No collective plot, everyone takes care of his field because the rich people occupied all the spaces. We do not associate the cultivation of yam and maize nor with cowpea	Currently there are no more collective plots.
Dassa, Lema	No collective plots; Hydromorphic soil gives more yams than other types of soil. Women grow tomatoes and chili.	There are households that have enough land and others do not, others lend against a fixed amount

In the communities, there are no collective plots for yam but market gardening is carried out by some women cooperative groups. Sometimes, man and woman can have common plot as they can have separate plots in the same field. Farmers from some villages adopt intercropping (crops in association eg maize-groundnut) while others adopt monocropping or rotation of crops. Muddy or sandy soils are not suitable for yam planting. In general, women dot not enjoy the land of their

parents. Men are the only beneficiaries. After marriage, women benefit of lands donated by their husbands but they have the obligation to help them first in their fields before going to work in their own field in the evening. In general, the men labour and the women pick up weeds and plant.

Do men and women farm on separate plots or shared farms in this community? If separate, what are the differences and similarities between men and women's plots? If shared, what proportion are each? If men and women farm together, are there differences in the type of work that men and women do? FGD 4.3

Table 5: Differences in men and women's plots (FGD 4.3)

Community name	Women Focus Group	Men Focus Group
Djidja, Zinkanmè	Lands : 90% for me and 10% for women. Men grow more crops that require strength (labour force). Sometimes women grow on the same crops on same land as their husband.	Lands: 90% and 10% for men and women respectively. The clearing, plowing and the fertilizer treatments are carried out by the men. Women weed, harvest and pick up. In some cases, men and women can do the same crops or different crops.
Djidja, Dan centre	Lands: 90% and 10% for men and women respectively; Husband gives 10% of his land to the wife to make the small productions. Sometimes the lands of men and women can be combined or separated.	Lands: 75 to 90% for men and 10 to 25% for women. Women can grow another crop or the same as men. Men do the plowing, the clearing. In addition to help men with weeding, the women do sowing and pickup harvest
Djidja, Lalo	Lands: 90% for men and 10% for women	Lands: 80 to 90% for men and 10 to 20% for women Men and women have the same farming pratices; do the same crops, but market gardening is primarily the women acitivity. Men and women weed and sow. Men plow, harvest yam tubers.
Djidja, Djidja centre	Lands: 90% for men and 10% for women Regarding differences, men grow more crops that require strength (labour force). Sometimes women grow on the same land as their husband and sometimes the same crops. Men do the hard work (plowing, root harvest) but the women make the vegetable crops and do the easier work (weeding etc.).	Lands: 80 to 90% for men and 10 to 20% for women. Men and women can do the same or different crops in the same or different way. However, women do not grow yam. Men plow while women and children harvest, dehull, weed, and sow.
Dassa, Igoho	Lands: 70 to 80% for men and 20 to 30% for women. Men and women do different activities, the men do the plowing. In addition to weeding, the women do the sowing.	Lands: 80% for men and 20% for women Men have fertile lands. Men do plowing and women the weeding. Men do the harvest because it is too difficult, but sometimes during the rain, women can help.

Community name	Women Focus Group	Men Focus Group
Dassa, Kpingni	Lands: 80-90% for men and 10-20% for women Women can cultivate the same or different crops than her husband. Women do not plow; they weed, tear off the feet of soybeans and harvest the yam. Men make the mounds of yam tuber	Lands: 70% for men and 30% for women Men plow, harvest the yams, while women preferencially sow and weed
Dassa, Dassa centre	Lands: 80% for men and 20% for women. Men have lands with fertile soils. Plowing is done by the man. Men plant yam on the ground but the woman covers it with mounds.	Lands: 80% for men and 20% for women. Sometimes women and men grow the same crops separately. In this case, man plows and the woman sows. They weed and harvest together in the case the crop is at the household level (together)
Dassa, Lema	Lands: 90% for men and 10% for women	Lands: 70% for men and 30% for women Men and women cultivate on separate plots. Women freely choose their crop. Men plough a furrow and plant the seeds but women sow other crops. Men harvest the yams

In all communities, no man gives more than 30% of lands to his wife. Men believe that women do not have enough force/strength to grow large plots. According to women, their husbands take all fertile/ good lands and the biggest because they do not want their wives to exceed them financially. Women have just enough to cultivate, enough to care for their children. In general, the fertile and hydromorphic lands are always grown by the men. Men do the hard work (plowing, root harvest) while the women make the vegetable crops and do easier work (weeding, picking up etc.). In some communities, women do not grow yam because it is worship interdict « le fétiche du village a interdit ».

1.1.2 Important crops in the community

What are the three most important crops for people in your community, in order of importance (1 is most important)? FGD 5.1

Table 6: Important crops in rural communities (FGD 5.1)

Crop importance	Women	Men	Dassa	Djidja
1st	Maize	Maize	Maize	Maize
2nd	Yam	Cassava	Yam	Yam
3rd	Cassava	Yam	Cassava	Cassava
4th	Soya	Groundnuts	Groundnuts	Soya
5th	Groundnuts	Soya	Soya	Groundnuts

Irrespective of gender and regions, fives crops are grown in the communities. Maize is the first important crop irrespective of gender and regions. The reason is that maize is, at the same time, for cash market (trade practices) and household consumption. In addition, it can be stored long time than any other crops: so, it is available for common usage at anytime since the majority of Beninese consumed the maize-based-products every day. In both regions, yam is the second important crops, and more than cassava because it is more valuable at market. There is clear difference by gender in yam and cassava ranking: cassava is the second priority crop and yam the third for men focus groups but conversely for women's focus groups. The reasons provided in women's FGDs for yam

ranking were that they can be harvested from six months and easily kept for home consumption. Men prefer cassava because they can sell it all year round to processors. There is no lean season for cassava.

Why are those crops important? FGD 5.2
Are there groups of people in the community for whom the crop is more important? (Probe differences in social segments) FGD 5.3

Table 7: Reasons why the crop is important and for who (FGD 5.2 and 5.3)

Crops	Reasons why the crop is important (Q 5.2)	People for who the crop is important (FGD 5.3
Maize	Home consumption and money (Women's FGD Djidja, men's FGD Dassa, men's FGD Djidja), first food and for sale, eated at home and processed in various products for sale (women's FGD Djidja); many derived foods, availabiliy all the year and for money, the most important food (women's FGD Dassa),	Men (all FGDs); Women (FGD Djidja) women (FGD Dassa)
Cassava	Many derived products and money (men's FGD Djidja, Men's FGD Dassa, women's FGD Dassa), women can process it alone (women's FGD Dassa)	Men (all FGDs)+ women (FGD Dassa) Women (FGD Dassa)
Yam	Energy/strength and money; more money than maize (women's FGD Djidja, men's Djidja), provides significant profits and possibility of storage for home consumption (women's and men's FGD Dassa), no need to treat the field with chemical fertilizer (men's FGD Djidja and Dassa), yam field is a sign of prestige/wealth (women's FGD Dassa),	Men and women (All FGDs Djdja) Men and women (All FGDs Dassa) Men (All FGD) Women (FGD Dassa)
Groundnuts	Income and home consumption (women's FGD Dassa), used for making oil, sauce and flat cakes (Men's FGD Dassa)	Women (FGD Dassa) Men (FGD Dassa)
Soya	High market value, high yield on any soil, just for marketing (women's FGD Djidja), for sale (Men's FGD Dassa)	Women (FGD Djidja) Men (FGD Dassa)

Overall, crops are important because they are grown essentially for household consumption and money (income of households); their availability the year round, the high comparative market value and ease of use are also cited for making priority between crops. The community members' interviews revealed clear differences in the "Reasons why the crop is important". For men (All FGDs), maize is grown mainly for home consumption and money while women indicated additional reasons, eg: women from Djidja pointed out a large variety of maize derived products and women from Dassa indicated its availability in the course of the year. As far as yam is concerned, it is considered as the crop with high operating profit, irrespective of gender and region. In addition, and for men, yam is produced without chemical fertilizer while women from Dassa indicated that yam is a prestige/wealth crop. Regarding cassava, it's grown because of money (net profit) and many derived products as revealed by communities (all men and Dassa women). Irrespective of gender and region, soya and groundnuts are grown for their market value.

1.1.3 Crop of focus

***Please describe how the crop is generally grown in this community (KII Q4)**
***What is the estimate proportion (%) of people in the community who grow the crop? KII Q5**

Table 8: Differences in men and women's plots (KII Q4, 5)

Community	Description of how the yam is grown	Proportion (%) of people in the community who grow the yam	Proportion (%) of the yam that the average household uses for making the boiled yam
Djidja centre	Two ways of planting yam: (a) To clear of stumps (Weeding) before making the mounds; (b) Make the mounds without weeding Yams are planted in association with maize	Ethnicity: Fon (100%) Wealth: Moderate wealth (30%), Wealth (70%) Age: < 18 (30%), > 18 (70%) Gender: Male (70%), Female (30%)	Ethnicity: Fon (50%), Mahi (50%) Wealth: Very poor (35%), Poor (35%) Moderate wealth (20%), Wealth (10%) Age: < 18 (70%), > 18 (30%) Gender: Male (70%), Female (30%)
Lema	To clear of stumps (Weeding) and making the mounds	Ethnicity: Sola (80%), Idaatcha (20%) Age: < 18 (30%), > 18 (70%) Gender: Male (60%), Female (40%)	Ethnicity: Sola (60%), Idaatcha (40%) Age: < 18 (40%), > 18 (60%) Gender: Male (20%), Female (80%)
Igoho	To clear of stumps (Weeding) and making the mounds	Ethnicity: Idaatcha (100%) Wealth: Very poor (50%), Poor (50%) Age : < 18 (60%), > 18 (40%) Gender : Male (50%), Female (50%)	Ethnicity: Idaatcha (80%), Peuls & Adja (20%) Wealth: Very poor (40%), Poor (40%) Moderate wealth (20%) Age: < 18 (50%), > 18 (50%) Gender: Male (50%), Female (50%)
Kpingni	To clear of stumps (Weeding) and making the mounds	Ethnicity: Mahi (100%) Wealth: Very poor (30%), Poor (30%) Moderate wealth (20%), Wealth (20%) Age: < 18 (20%), > 18 (80%) Gender: Male (60%), Female (40%)	Ethnicity: Mahi (100%) Wealth: Very poor (35%), Poor (30%) Moderate wealth (20%), Wealth (15%) Age : < 18 (40%), > 18 (60%) Gender : Male (50%), Female (50%)

Community	Description of how the yam is grown	Proportion (%) of people in the community who grow the yam	Proportion (%) of the yam that the average household uses for making the boiled yam
Kpékouté	Weeding before making the mounds Yams are planted in association with maize	Ethnicity: Idaatcha (60%), Other (40%) Wealth: Very poor (20%), Poor (80%) Age : < 18 (30%), > 18 (70%) Gender : Male (60%), Female (40%)	Ethnicity: Idaatcha (80%), Peulhs & Adja (20%) Weath: Very poor (40%), Poor (40%) Moderate wealth (20%) Age: < 18 (40%), > 18 (60%) Gender: Male (50%), Female (50%)
Dan centre	Weeding before making the mounds Yams are planted in association with maize and bean	Ethnicity: Fon (100%) Wealth: Very poor (70%), Poor (30%) Age: < 18 (40%), > 18 (100%) Gender: Male (100%)	Ethnicity: Fon (100%) Weath: Very poor (%), Poor (25%) Moderate wealth (40%), Rich (20%) Age: < 18 (30%), > 18 (10%) Gender: Male (40%), Female (60%)
Lalo	Weeading before making the mounds Yam is not associated with another crop	Ethnicity: Fon (100%) Wealth: Very poor (25%), Poor (25%) Moderate wealth (50%) Age: < 18 (40%), > 18 (60%) Gender: Male (80%), Female (20%)	Ethnicity: Fon (100%) Weath: Very poor (60%), Poor (30 %) Moderate wealth (10%) Age: < 18 (75%), > 18 (25%) Gender: Male (50%), Female (50%)
Zinkamin	Making the mounds and planting, Put grass on the mounds, preventing the drying up. Yams are associated with okra	Ethnicity: Fon (70%), Mahi (10%), Yoruba (10%), Adja (10%) Wealth: Very poor (50%), Poor (30%) Moderate wealth (20%), Age: > 18 (100%) Gender: Male (70%), Female (30%)	Ethnicity: Fon (60%), Idaatcha (10%), Yoruba (10%), Adja (20%) Wealth: Very poor (60%), Poor (20%), Moderate wealth (10%), Wealth (10%) Age: < 18 (30%), > 18 (70%) Gender: Male (50%), Female (50%)

Yam is grown in different ways depending on community. Two ways of planting: (a) To clear of stumps (Weeding) before making the mounds, (b) make the mounds without weeding Yam is sometimes associated with maize, bean or okra. Overall, the communities involved in yam cultivation belonged to many socio-economic groups (ethnicity, wealth, gender, age). The differences have been highlighgted by gender, wealth status and ethnicity. Men are much more involved in this yam cultivation than women. In Dassa, it is mainly the idaatcha while in Djidja, it is much more the Fon ethnic groups. Yam is grown by the adultes (over 18 years old) and mainly by poor and very poor to increase their wealth status.

1.1.4 Varieties of the crop and planting material

What are the varieties of the [crop under study] that you grow? Rank in order of importance 1=most important. (Note local and technical name – verify with key informant) II Q15.1

Table 9: Varieties grown in order of importance (II Q15.1)

Importance	Gender		Region		Main activity	
	Women	Men	Dassa	Djidja	Farmers	Others
1st	Laboko	Laboko	Laboko	Kokoro	Laboko	Laboko
2nd	Kokoro	Moroko	Moroko	Laboko	Kokoro	Kokoro
3rd	Moroko	Kokoro	Tchewere	Gnidou	Moroko	Kpètè
4th	Gnidou	Gnidou	Kokoro	Kpètè	Gnidou	Aklachi
5th	Aklachi	Aklachi	Yanrambo	Aklachi	Tchewere & Kpètè	Gnidou

Yam varieties locally named "Laboko", "Kokoro" and Moroko are the most important grown irrespective of gender and regions under study. Laboko is the first recognized by all communities (except Djidja) as the best quality yam for preparing any related dishes while kokoro is better for storage in addition to its ability to make many dishes. The other varieties (Tchewere, Yanrambo 'for Dassa', and Gnidou, Kpètè, Aklachi 'for Djidja') are specific for each region in relation with the quality requirements of local consumers. Indeed, in the Dassa region, pounded yam is preferentially prepared with Laboko and consumed in the course of the year while Kokoro is preferred for dried chip and pounded yam. Regarding gender aspect, the varieties "Kokoro" and "Moroko" do not have the same importance: the women prefer kokoro for its long storage and for its ability to be dried into flour whereas men prefer moroko for its high market value.

Why do you grow this variety? II Q 15.2 a+b

Table 10: Reasons why the variety is grown (II Q15.2), % of citing.

Varieties	Reasons why preferred	Dassa (n = 40)	Djidja (n=40)	Male (n=29)	Female (n=51)
Laboko	Money	45	25	45	29
	Good to pound	27,5	22,5	24	25
	Harvest early (6 months)	32,5	10	34	14
	High yielding	15	2,5	14	6
	Domestic consumption	10	12,5	14	10
Kokoro	Good to pound	10	22,5	17	16
	Money	5	15	10	10
	Processing into amala	5	12,5	14	6
	Good to boil	2,5	12,5	7	8
	Domestic consumption	0	15	14	4

Varieties	Reasons why preferred	Dassa (n = 40)	Djidja (n=40)	Male (n=29)	Female (n=51)
Gnidou	Big size	0	20	7	12
	Money	2,5	20	17	8
	Good to boil	7,5	10	10	8
	Domestic consumption	0	7,5	7	2
	Good to fry	5	2,5	0	6
Moroko	Money	20	0	10	10
	Good to pound	17,5	0	10	8
	Harvest before 10 months	15	0	7	8
	Domestic consumption	10	0	7	4
	High yielding	7,5	0	7	2
Tchewere	Good to pound	10	0	7	4
	Harvest before 10 months	7,5	0	7	2
	Domestic consumption	5	0	3	2
	Money	5	0	3	2

The ability of varieties to be boiled or/and pounded is one of the reasons for their preference. The market value is also considered in the choice of the variety to grow and Laboko had the highest market value and Tchewere the lowest. However, no variety is produced only for sale; they are also eaten at home. Famers prefer also the early varieties that can be harvested after less than a year of plantation.

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

What are the most important characteristics that would make it a good crop you would use? **OPEN QUESTION NOT SPECIFIC TO A PRODUCT. Rank in order of importance. The question aims to understand the indicator the participants use to assess a good crop – (agronomical characteristics, post-harvest characteristics: morphological and storability characteristics, technological characteristics) II Q14.1 and 14.2

Table 11: Characteristics of a good yam (II Q14)

Importance	Women	Men	Dassa	Djidja
1st	Big head variety/big sized tuber	Big head / big sized tuber	Big sized tuber	Big sized tuber
2nd	Smooth peel/ smooth peel without injury	Long tuber/ long tuber with thorny red head	Long tuber with red thorny head / long tuber & large leaf / long tuber with pointed head/ long & attractive tuber/ long tuber without hard peel	Smooth peel/ smooth peel without injury
3th	Long tuber/ long tuber with thorny red head	Smooth peel/ smooth peel without injury	Thin peel	Free from insects/ants/hole
4th	Free from insects/ants/hole	Heavy tuber	Free from insects/ants/hole	Long tuber with red thorny head/ long variety& large leaf/ long tuber with pointed head/ long & attractive tuber/long tuber without hard peel
5th	Head appearance/pointed head of the yam	Free from insects/ants/hole	Smooth peel/ smooth peel without injury	White/ yellow flesh
6th	White/ yellow flesh	Peel's colour/ moderately black peel/ colour of yam	Heavy tuber, good for boiling & pounding/ heavy tuber with fibrous peel/	Easy to store & long period of storage/ long period of storage

Most of the characteristics cited are common to both gender and region. Big tubers were preferred for their market value and ease in peeling. Characteristics related to "big sized tuber/smooth peel without injury/ long tuber with thorny red head " were the most important regardless the gender and region. The first three important characteristics are common to men and women but with different ranking. For example, smooth peel is ranked as the second important characteristic for women while it was ranked third for men's focus groups. The reasons provided by women were related to their ability to give a good quality boiled yam (when the peel is smooth). Regarding region, some differences were noted. For instance, Dassa's men cited "heavy tuber" as one of the most important characteristics, while Djidja's women consider "white or yellow flesh" to be one of the most important characteristics.

1.1.6 Labour

***this question may not be in all questionnaires… Who does production & processing labour for each of the products in your household? Probe household members, gender, age (II Q16.2 revised questionnaire)**

Who sells [product] in your household? Probe household members, gender, age (II Q16.3 original or 16.2 revised)

Table 12: Frequency of citations of people who conduct the (indicate: production + processing for pounded yam (A), boiled yam (B), fried yam (C) and dried yam (D) by sex and region (II Q16.2)

(A) : Pounded yam

People who produce and process the Pounded yam	Respondents (% of citations)			
	Women (N=51)	Men (N=29)	Dassa (N=40)	Djidja (N=40)
Men	73	38	35	28
Women	29	66	65	75
Men and women	4	14	12,5	3
Youth (male)	18	14	2,5	30
Youth (female)	18	14	2,5	30
Together with children	31	10	32,5	15

(B) Boiled yam

People who produce and process the Boiled yam	Respondents (% of citations)			
	Women (N=51)	Men (N=29)	Dassa (N=40)	Djidja (N=40)
Men	75	24	37,5	25
Women	16	66	42,5	53
Men and women	2	3	0	4
Youth (male)	14	10	2,5	18
Youth (female)	14	14	2,5	20
Together with children	25	10	27,5	10

(C) Fried yam

People who produce and process the Fried yam	Respondents (% of citations)			
	Women (N=51)	Men (N=29)	Dassa (N=40)	Djidja (N=40)
Men	47	10	20	13
Women	6	45	35	25
Men and women	0	0	0	0
Youth (male)	12	7	0	20
Youth (female)	12	10	0	23
Together with children	8	7	14	0

(D) Dried yam

People who produce and process the Dried yam	Respondents (% of citations)			
	Women (N=51)	Men (N=29)	Dassa (N= 40)	Djidja (N=40)
Men	41	14	22,5	12,5
Women	10	38	27,5	40
Men and women	2	14	5	7,5
Youth (male)	6	3	0	10
Youth (female)	6	7	0	12,5
Together with children	4	7	5	5

Yam processing is achieved mainly by women in both regions as revealed frequency of citations. There was converse thought as far as gender citations are concerned: great proportion of women cited men as people who produce and processe yam (pounded, boiled, fried and dried forms) while men pointed out women as mainly responsible. These embarrassed responses can be due to the way the question is asked to interviewed people since it takes into account "produce and process". Regarding the young people, less than 5% of Dassa's young are involved in yam processing such as pounded yam, boiled yam, fried yam and dried yam, while 10 to 30% citations were recorded at Djidja.

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

What is your level of independence in making decisions regarding… II Q31.1-31.4
31.1 what [variety of crop] material to plant
31.2 a) use of crop (what product)
31.2 b) Marketing
31.3 use of profits from sale of [product under study]
31.4 use of profits from sale of alternative product sold from [crop under study], if different household member (e.g. fresh

Table 13: Mean score of independence in decisions making by sex and region (II 16.4)

Decision	Mean score of independence 1-4*			
	Women	Men	Dassa Region	Djidja Region
Variety of yam to plant	1.9	3.0	2.4	2.2
Use of yam and marketing	2.3	2.7	2.4	2.4
Use of profits from sale of boiled yam	2.4	2.6	2.5	2.6
Use of profits from sale of alternative product	2.6	3.0	2.8	2.8

*Legend
1=no independence the decision is made by someone else,
2=a little independence to suggest ideas but decision is taken by someone
3=most independent but need to consult someone
4 = complete independence.

Neither gender nor region were completely independent (mean score <4) in decision making and trade-offs between the different uses of the yam. However, men recorded high independence score for some decisions making: difference between the men and women was pronounced on the choice of the variety of yam to plant and, to a lesser extent, on the "use of yam and marketing". Indeed, men are more independent with the possibility of consulting someone while women have little independence. Regarding the region, no clear difference was observed.

***Thinking about when the [crop under study] is harvested, how do you make the decision to harvest? Who was involved and what was considered? II Q17.1**

Table 14: Frequency of citations of the decision making to harvest

What are the types of factors that people consider before they harvest?	Respondents (% of citations)			
	Women (N=51)	Men (N=29)	Dassa (N= 40)	Djidja (N=40)
Craked mounds	14	17	34	43
Colour of leaves (yellow or red)	18	17	44	43
Market value during harvest period	2	17	5	43
Matury of leaves/dried leaves	16	14	40	34

Four main factors are considered before harvesting yam in the communities under study. They are cracked mounds, color of leaves, market value during harvest period and dried leaves). The market value during harvest period is more important for the men from Djidja.

- **Who makes decision on how the crop would be used among the different products? About what is consumed at home or sold? Who was involved and what was considered? II Q17.2**

Table 15: Frequency of citations of people who make the decision to processing

Decision making on the use of yam		Respondents (% of citations)			
		Women (N=51)	**Men (N=29)**	**Dassa (N= 40)**	**Dlidja (N=40)**
Who makes decision on how the crop would be used among the different products?	Men	49	55	40	55
	Women	24	10	8	8
	Men and women	18	28	28	15
About what is consumed at home or sold?	Men	49	72	60	55
	Women	0	17	8	5
	Men and women	22	17	25	15

Overall, men make the majority of decisions about how the yam should be used for the different products as well as the part that will be consumed or sold. Men sometimes associate women in these decisions, but women never make decisions alone.

1.2.1 Household food budgeting

Thinking about when you harvest the [crop under study]. How much of the harvest was used for consumption at home? As what product? (kg/t) (II Q33.1)

Table 16: Quantity of harvest used for home consumption by sex and region (II Q33.1)

	Women	Men	Region Dassa	Region Djidja
Range (%)	10 - 100	10 - 100	10 - 70	10 - 100
Mean (%)	43.2	46.0	38.6	48.3

How much of the harvest was sold? (kg/t) Fresh or processed into what product(s)? To what market(s)? Probe between rural or urban market, trader, restaurant, food vendor, large company. II Q33.2

Table 17: Quantity of harvest sold by sex and region (II Q33.2)

	Women	Men	Region Dassa	Region Djidja
Range (%)	10-90	10 – 90	30 - 90	10 - 90
Mean (%)	57.8	54.5	61.3	55.9

Irrespective of gender and region, there are large variability in the quantity of yam used for home consumption or sold at market. Sometimes and in case of need, all the harvest is used for home consumption. Mean values indicated that more than half of harvest was sold in accordance with the quantity consumed.

Have changes in the production, processing or sale of the product affected you/your spouse/children? II Q34.1

Table 18: Changes in the production, processing or sale of the product who affected you/your spouse/children

	% of women citing N=19	% of men citing N=10	% of Dassa N= 10	% Djidja N=19
Low rainfall	26.3	40	80	10.5
Slight increase in sales	5.3	20	10	10.5
Farmer's old age	10.5	20	10	15.8
Poor soil quality due to transhumance	21.0	10		26.3
High availability of seeds	16			15.8
Low yield	5.3	10		10.5

Dassa's men think that low rainfall affects their families (wife, children and themselves). Djidja's men believe that a slight increase in sales affects their family. For the women from Djidja, the weak fertility of the soil affects their families (their husbands, children and themselves).

Have there been any changes in the market or mechanization in your community? How has this affected your work? What about other groups of people? II Q34.2

As far as the mechanization is concerned, only some (38%), especially the rich bought tractors to increase their production. So, these changes did not affect the majority of the community (61%) work.

1.3 Preparation and processing the product

***What are the processing and preparation steps for the [product]? FGD Q12**

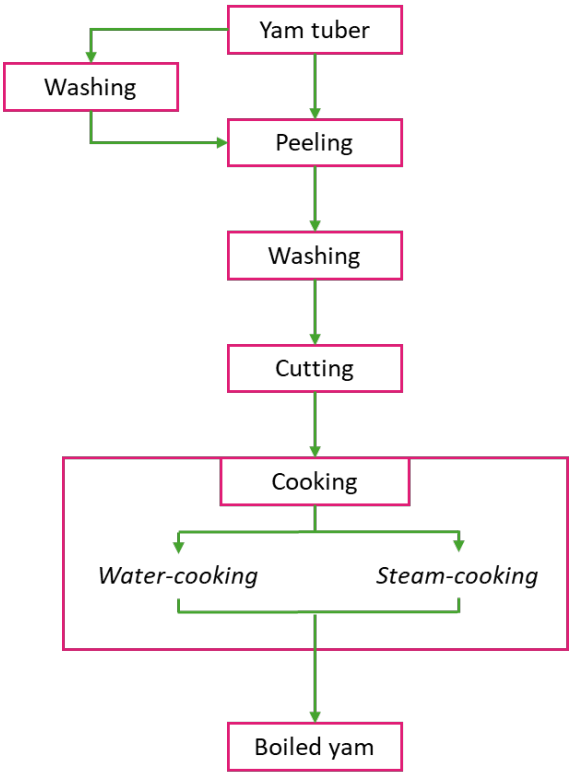

Figure 1: Flow diagram of boiled yam processing

Boiled yam pieces are obtained by peeling, washing, slicing and boiling the yam pieces in water. Boiling is done by completely immersing the tuber in water during cooking or by cooking the tuber by directly exposing it to hot steam. Another difference between the processors is the number of washing. Some processors carried out the washing before peeling or after peeling. Women from Djidja carried out two washing: one before and another after slicing.

***Are there variations of the product and variations of the processing of the [product] in your community? Are the variations related to different varieties, food processes or food preferences? Please describe. FGD Q13**

Table 19: Variations of the product and processing of boiled yam

Community name	Variation of the product and processing of boiled yam	
	Women Focus Group	**Men Focus Group**
Djidja, Zinkanmè	No information	Yam varieties are not the same. Preference and variety availability guide the choice: there are people who like the hard-boiled yam while others, friable boiled yams.
Djidja, Dan centre	In period of scarcity we have difficulties to sell. Women have difficulty to find yam with high quality. So, processing activities are limited.	Sometimes, the pot in which the yam is prepared may not be clean (the odour of the last meal may impact on the quality of the boiled yam). Yam varieties or the ways of cooking are different; it depends upon what each one likes.
Djidja, Lalo	No information	Neither the ways of cooking nor the varieties are the same.
Djidja, Djidja centre	Variations are observed in yam varieties. However, all yam varieties are good for boiled yam except "gnidou". The best for boiled yam are varieties "dodo" and "kodjèwé".	Each one has his way of cooking. Yam varieties are not the same, some people like when they are hard and others pefer when they are friable.
Dassa, Igoho	Yam varieties are not the same. So, the change depends on the variety and the processor. Each variety gives its quality boiled yam.	The boiled yam obtained depends on the variety and also on the storage duration after harvesting. Yam varieties don't have the same quality during cooking. Moreover, we prefer eating the varieties that we know they give a good boiled yam.
Dassa, Kpingni	Yam varieties are different, the process is the same. As the varieties are not the same, the boiled yam quality varies from one variety to another, depending on the cooking.	The quality of boiled yam depends on the processor. The varieties are not the same.

Community name	Variation of the product and processing of boiled yam	
	Women Focus Group	**Men Focus Group**
Dassa, Dassa centre	Variations are related to the colour, the friability and the sweetness. Variations are linked to varieties and preferences.	No information
Dassa, Lema	Neither the food process nor the varieties change	Variations are linked to the variety since yam varieties are not the same and everybody doesn't cook the yam in the same way and there are some people who like friable yam while others like the slightly hard-boiled yam.

The quality of the boiled yam depends on the varieties used, storage duration after harvesting and the processing method used. Yam varieties don't have the same behaviour during cooking. There is no specificity between region and genre.

***What are the most important processing steps or parameters you need to control very well to obtain of high quality [product under study]? II Q22.**

Table 20: Most important processing steps to obtain a higher quality of boiled yam cited by sex and gender (II Q22)

Most important processing steps	Respondents (% of citations)			
	women N= 51	**men N= 29**	**Dassa N= 40**	**Djidja N= 40**
Peeling	42	53.3	40.0	50.0
Cutting	8	_	7.5	2.5
Washing	42	53.3	47.5	47.5
Ratio water/ yam	14	6.7		17.5
Intensity of the fire	8	_	_	10.0
Steam cooking	4	3.3	_	7.5

Both gender and region cited peeling and washing as the most important operations. The peeling is important because at this step, all external/foreign matter unfit to consumption is removed. A good washing contributed to keep or improve the attractiveness

1.4 Consumption of the product

What is the [product] consumed with? FGD Q16.2

Table 21: Food/ ingredients accompanying of boiled yam

Community name	Food/ingredients/sauce+boiled yam	
	Women Focus Group	**Men Focus Group**
Djidja, Zinkanmè	Egg, beans and grilled peanut	No information
Djidja, Dan centre	Frield tomato, oil and pepper	Oil, fried tomato and pepper
Djidja, Lalo	Fried tomato, omelette and peanut oil	Oil and pepper
Djidja, Djidja centre	Omelette and meat	Pepper, oil and sometimes vegetables
Dassa, Igoho	Oil and pepper	Oil, pepper and onion
Dassa, Kpingni	Peanut oil and beans	Oil and pepper
Dassa, Dassa centre	Oil, pepper, fried tomato and boiled beans	No information
Dassa, Lema	Oil, pepper and salt	Oil and pepper

No difference between the gender and region regarding food accompanying such as oil, pepper, frying, eggs, meat, beans, peanuts.

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? KII Q9.

Table 22: Changes in the last five years on how often is boiled consumed

Community	Changes in the last five years on how often is boiled yam consumed
Djidja centre	Boiled yam can be bought
Lema	Difficult to identify
Igoho	No information
Kpingni	Household is not the same. Some husbands have four wives.
Dassa centre	No change because other foods such as maize paste is also consumed
Dan centre	The consumption increases following the household size
Lalo	No change for the production.
Zinkamè	In the past, Gnidou is preferred for boiling, but nowadays Laboko is used because of these sensory properties

There was no change. Household consumption is relative to the size of the household.

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? KII Q10.

Table 23: Level of buying compared to five years ago

Community	Level of buying compared to five years ago
Djidja centre	Children buy at school. Men buy more than women because they are at home. The ethnic group “fon” buys frequently. The rich do not buy boiled yam
Lèma	Consumption has decreased because of financial difficulties. There is no difference in consumption between ethnic groups or ages
Igoho	Children eat frequently because it satiates. There is no difference between ethnic groups, ages, or between men and women
Kpingni	There is no difference between ethnic group, ages, or between men and women
Dassa centre	No information
Dan centre	The people of this village do not buy boiled yam. Only traveling workers buy
Lalo	The people of this village do not buy boiled yam. Only my wife started selling since 12 months but she has not had a strong customer base
Zinkamè	The consumption of boiled yam gives strength. Men buy more than women. The Fon ethnic group buys frequently.

During the past five years, the sale of boiled yam decreased. Men buy more than women. Fons buy more than other ethnic groups.

1.5 Product characteristics

Q20 : *If you were to purchase the crop on the market to make the product, how do you recognise and perceive a good crop variety for making a high-quality product ? By looking at it, by touching, smelling or by tasting it?

Table 24: Quality characteristics of raw yam for making high quality boiled yam

Descriptors	Citation ranking (%)		Fréquency (% respondents, n = 80)
	Men	Women	
Smooth peel/without hump or thorns	49.6	40.1	87.5
Brown peel*	8.8	19.8	20
Cracked/scratched peel	15.0	14.2	20
Rough/shaggy/hump peel*	15.9	6.2	16.25
Thin peel	3.5	9.3	11.25
Not crumbly peel	5.3	4.3	6.25
Keeping white or yellow colour during peeling with nails	1.8	6.2	7.5

Note: * significant difference between the men and women at 5% (p-value<0.05)
NB: Descriptors quotation are expressed either by ranking citation or by frequency of citations

Q21: What are characteristics of a variety of the crop that give a poor quality product so that you would not use or buy it?

Table 25: Quality characteristics of raw yam for making poor quality boiled yam

Descriptors	Citation ranking (%)		Fréquency (% respondents, n = 80)
	Man	Woman	
Yellow/dark/red/green flesh during peeling	37.1	28.2	35
Roughed/shaddy/humped/thorned peel*	43.8	32.3	46.25
Big tuber*	1.1	19.8	12.5
Ugly tuber	5.6	11.5	11.25
Presence of insects*	1.1	8.4	5
Presence of rootlets in flesh*	11.2	0.0	5

Note: * significant difference between the men and women at 5% (p-value<0.05)
NB: Descriptors quotation are expressed either by ranking citation or by frequency of citations

*A good raw yam for making a high quality boiled yam was evaluated through the **appearance** of the peel or the flesh of the tuber (table 24). In general. women have cited more and variable quality characteristics than men. The flesh colour of raw yam. cited by respondents. was related to white or yellow. The white or yellow colours of the flesh were recognized as good quality characteristic for raw yam tuber intended to be boiled. whereas the dark brown or red colours of the flesh are not appreciated (table 25). As a rule. raw tuber peeled or cut may remain white or yellow for boiling. The change in colour of the flesh during peeling was perceived as bad for boiled yam. As far as peel appearance of raw yam is concerned. contrasting characteristics such as smooth peel or rough peel have been cited as good quality characteristics for making a high quality boiled yam. However. a few stakeholders pointed out rough peel as bad/poor quality characteristic. To a certain extent. other characteristics such as thin. cracked. not crumbly peel etc. were also cited.*
Regarding other poor quality characteristics of raw yam for boiling. respondents have cited the presence of insects. the big size of the tuber. the last one cited mainly by women (table 25). For both skin and flesh. significant difference was evidenced between men and women citations (P < 0.05) for some characteristics such as shaggy/rough/hump peel. brown peel. big roots. bitter/not sweet. hairy peel and presence of insects (tables 24 & 25).

Q23: *Thinking about when you process the crop. what would be the characteristics that show it has good processing ability into the product?

Table 26: Quality characteristics of raw yam during processing into boiled yam

Characteristics	Citation ranking (%)		Fréquency (% respondents, n = 80)
	Man	Woman	
Keeping white/yellow/whitish yam during peeling*	16.7	29.9	38.75
Good odour of cooking water and steam	16.7	16.4	8.75
Keep white or yellow colour during cooking	18.1	14.1	18.75
Friable/easy to break with fork during cooking*	26.4	9.0	26.25
Easy to slice/ not too hard*	4.6	5.6	7.5
Thin peel	5.6	5.6	8.75
Stickiness*	0.0	7.3	6.25
Easy to peel	4.2	5.1	6.25
Good odour of yam at end of cooking	7.9	6.8	11.25

Note: * significant difference between the men and women at 5% (p-value<0.05)
NB: Descriptors quotation are expressed either by ranking citation or by frequency of citations

Technological characteristics of raw yam were evaluated first of all during peeling and they concerned mainly the peel and the appearance of yam tuber (table 26). Yam appearance is significantly more important for the women. It should be smooth and the flesh should remain white or yellow while peeling, as quoted above. The easiness to peel and the stickiness of peeled yam to fingers were significantly and highly cited by the women as important for a good quality boiled yam. Technological characteristics were also evaluated during cooking. Cooking step is controlled to limit the water absorption of yam pieces because if the optimum cooking time is exceeded. the pieces may be overcooked due to water absorption. since it indicates the quality of boiled yam. As a rule. when cooking water is viscous/heavy (with the presence of starchy material). it is an indicator of the end of cooking; the end of cooking is also indicated by the steam with a good smell of cooked yam. The friability of the yam pieces. as easy to break. was also evaluated by the fork during cooking; this characteristic is very important for men. The change in colour during cooking was cited as a bad quality characteristic for the boiled yam.

Q28: *Describe the characteristics of a high-quality final product prior to consumption.

Table 27: High quality characteristics of boiled yam in mouth

Characteristics	Citation ranking (%)		Fréquency (% respondents, n = 80)
	Man	Woman	
White colour	23.5	20.3	52.5
Egg yellow/yellowish	21.2	14.9	46.25
Pleasant appearance/attractive/nice/clean	17.3	23.9	56.25
Stickiness to the fingers*	0.0	1.8	20.0
Soft yam	3.4	3.6	21.25
Swolling yam	3.4	3.3	10.0
Friable/not hard	20.7	20.7	63.75
Good odour of yam	10.6	11.6	41.25

Note: * significant difference between the men and women at 5%
NB: Descriptors quotation are expressed either by ranking citation or by frequency of citations

- **Q28.1: When you eat the product? What are the characteristics of a high quality product in the mouth and how do you evaluate it? Taste. texture in the mouth. aroma etc.. depending on the consumption form?**

Table 28: High quality characteristics of boiled yam in mouth

Characteristics	Citation ranking (%)		Fréquency citation (n = 80)
	Man	Woman	
Good taste/sweet	43.5	52,0	40.7
Friable/tender	21.7	19,2	23.5
Good aroma of yam	11.6	6,4	17.3
Bitter	8.7	7,2	6.2
Stickiness	11.6	5,6	4.9
Soft yam	2.9	9,6	9.9

These quality characteristics can be grouped into four characteristics including appearance. texture. odour and taste (tables 27 and 28). No significant gender association (P > 0.05) was evidenced. Attractiveness as well as white or yellow colour was cited for appearance prior consumption (table 27). The crumbliness/friability. easiness to break with hand and stickiness were the important criteria of texture prior to taste (table 27) and in mouth (table 28). Boiled yam must have a good aroma and little sweet taste (table 28). In mouth. the easiness to chew is also considered for a good quality boiled yam.

Q29: *When a person (you or a member of your family) says that the quality of the product is not good when he eats it. what are they complaining about/what are the reasons?

Table 29: Bad quality characteristics of boiled yam

Characteristics	Citation ranking (%)		Fréquency citation (n = 80)
	Man	Woman	
Bitter/bad taste/not sweet/sour	45.6	40.6	61.25
Hard/not friable/difficult to eat	33.0	29.9	52.5
Dark/red colour	21.3	19.7	32.5
Presence of radicles/fibers in the flesh *	0	5.8	7.5
Unpleasant odour*	0	3.7	5

Note : * significant difference between the men and women at 5%
NB: Descriptors quotation are expressed either by ranking citation or by frequency of citations

Boiled yam is recognized bad when the taste is bitter and not sweet at all (table 29). Texture is also determinant in the bad quality of boiled yam. Accordingly. hard. not crumbly and difficulty to chew were more cited. Regarding colour. boiled yams with red or dark colour were rejected. In addition to these criteria. the presence of fibers and radicles in flesh was highly cited by women as bad quality of boiled yam.

1.6 Synthesis of quality characteristics of yam in the food chain of boiled yam

Quality characteristics of yam tuber and boiled yam pieces are presented in Tables 30 and 31 that gives an overview of quality traits of yam tuber appropriate for boiling and at each step of the preparation of boiled yam (during peeling and during boiling). The information gathered along the food chain deal with quality attributes of **raw yam** (*colour of flesh and peel. appearance of peel. size of tubers*). during **processing** (*easy to peel. colour of flesh during peeling and cooking. aspect and odour of cooking water*) and. of **boiled yam pieces** (*colour. odour. texture. taste*).
In comparison with the SOK. more reliable information was collected on yam tuber characteristics. However. these criteria on yam tuber are certainly related to the yam varieties processed daily in the study area. It can be consolidated by the process characterization. Regarding the quality criteria of boiled yam. most of the collected information was reported by the literature review. The champion processors should provide more descriptors during process characterization. An overview of boiled yam descriptors is important to establish a comprehensive sensory mapping of boiled yam.

Table 30: Overview of yam tuber quality characteristics and its behaviour during processing into boiled yam

ITEMS	CHARACTERISTICS	INDICATORS	FREQUENCY (%. n = 80)
A good yam **VARIETY** for making a **HIGH-QUALITY** product ? By looking at it. by touching. smelling or by tasting it? (Q20)	Brown peel	By looking	20
	Smooth peel/without hump or thorns	By looking and touching	87.5
	Cracked/scratched peel	By looking	20
	Rough/shaggy/hump peel	By looking and touching	16.25
	Thin peel	Easy peeling with nails	11.25
	Not crumbly peel	Easy separation of outer and inner bark	6.25
	Keeping white or yellow colour during peeling	No change of flesh colour	7.5
	Skin free from holes	By looking	7.5
	No too big or too long tubers	No information	5
	Free from rot odour	By smelling	5
Characteristics of the **VARIETY** that give a **POOR QUALITY** product so that you would not use or buy it? (Q21)	Yellow/dark/red/green flesh during peeling	Change of colour during first second of peeling	35
	Roughed/shaddy/humped/thorned peel	Presence of rootlets or/and humps	46.25
	Big tuber	Difficult to roll yam diameter with hand	12.5
	Ugly tuber	Multiform/presence of rootlets/humps	11.25
	Presence of insects	By looking	5
	Presence of rootlets in flesh	By looking after peeling	5
Characteristics that show it has good **PROCESSING ABILITY** into the **BOILED YAM** (Q23)	Keeping white/yellow/whitish yam during peeling	By looking	38.75
	Easy to peel	Bark not sticky to flesh / not require physical strengh	6.25
	Thin peel	Slight thickness of outer bark	8.75
	Easy to slice/ not too hard	Not require physical strengh	7.5
	Keep white or yellow colour during cooking	By looking	18.75
	Friable/easy to break with fork during cooking	Easiness to push the fork	26.25
	Good odour of cooking water and steam	Know-how on odour characteristic of steam during cooking	8.75
	Stickiness	Ability of the back fork to stick boiled yam pieces	6.25
	Good odour of yam at end of cooking	Know-how on odour characteristic of boiled yam	11.25

Table 31: Quality criteria of boiled yam

ITEMS	CHARACTERISTICS	INDICATORS	FREQUENCY (%. n = 80)
Characteristics of a **HIGH-QUALITY BOILED YAM PRIOR TO CONSUMPTION** (Q28)	White colour	By looking	52.5
	Egg yellow/yellowish	By looking	46.25
	Pleasant appearance/attractive/nice/clean	By looking	56.25
	Stickiness to the fingers	By tooching	20
	Soft yam	By pressing in fingers	21.25
	Swolling yam	By turgesence	10
	Friable/not hard	Easiness to break with fork	63.75
	Good odour of yam	By smelling	41.25
Characteristics of a **HIGH QUALITY BOILED YAM IN THE MOUTH** and how do you evaluate it? (**Q28.1)**	Good aroma of yam	After chewing	17.3
	Friable / tender	Easiness to chew	23.5
	Soft yam	Easiness to cut with the teeth	9.9
	Stickiness	Slightly stick to the teeth	4.9
	Good taste/sweet	By tasting	40.7
	Bitter taste	By tasting	6.2
Characteristics of a **POOR QUALITY BOILED YAM** when we eat it? (Q29)	Bitter/bad taste/not sweet/sour	By tasting	61.25
	Hard/not friable/difficult to eat	Long duration of chewiness	52.5
	Dark/red colour	By looking	32.5
	Presence of radicles/fibers in the flesh	By looking	7.5
	Unpleasant odour	By smell	5

2 FINDINGS: MARKET STUDY (IITA-BENIN)

2.1 Sample information

Background information on sample MI Q1-7 (first) Q1-14 (Nigeria learning doc)

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

Interview	001	002	003	004	005	006	007
Gender	FEMALE	FEMALE	MALE	MALE	FEMALE	FEMALE	FEMALE
Age (profile)	28	35	19	56	20	52	33
Ethnicity	Sola	Fon	Idaatcha	Fon	Idaatcha	Fon	Mahi
Household size	3	5	0	5	2	4	4
Level of education	Illiterate	Secondary school	Primary School	Secondary school	Secondary school	Illiterate	Illiterate
Ownership of means transportation (If yes, type)	No	Yes, Motorbike	Yes Motorbike	Yes, Motorbike	Yes, Motorbike	Non	Non
Ownership of means of communication (If yes, type)	No	Yes, Phone	Yes, Phone	Yes, Phone	Yes, Phone	Yes, Phone	No
Road to nearest town is good (Y/N)	No	No	No	No	No	No	No
Distance to market from the home (in km)	10	6	7	5	9	15	12
Marketing experience (years)	10	15	2	27	4	25	7
Main occupation (Specify)	Trader	2nd Authority of village	Producer	Yam trader/ market manager	Trader	Trader	Trader
Crops person is dealing with (indicate main crops or products)	Yam	Maize, Yam, Cotton	Yam	Yam	Boiled Yam	Yam	Boiled Yam

2.2 The value chain

***What are the major locations where the yam is grown and marketed? (MI Q8 original questionnaire, Q15 revised Nigeria)**

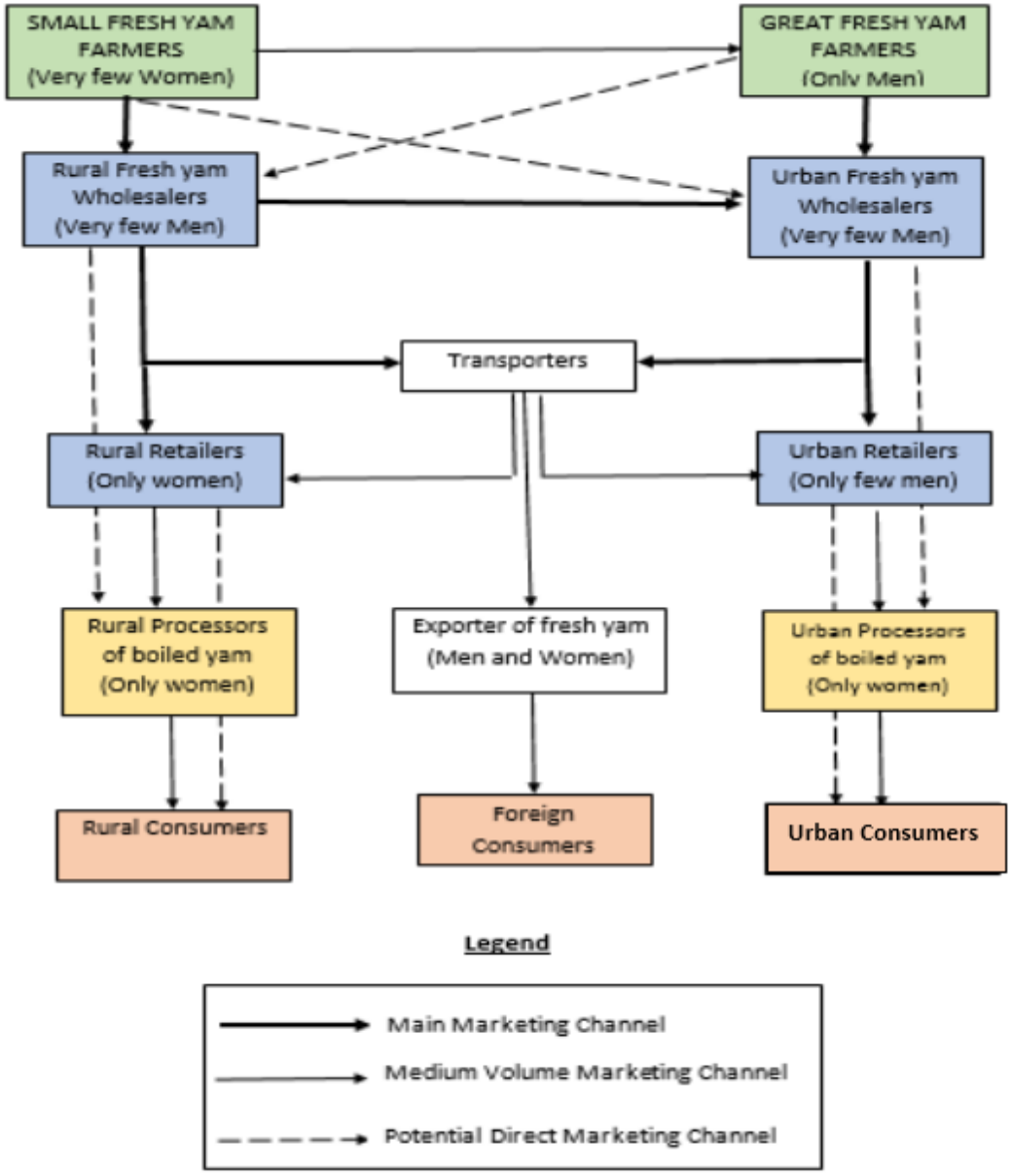

Figure 2: Marketing channel and boiled yam value chain in Dassa and Djidja

The mapping has shown that there are close and formal links between the different actors in the boiled yam chain in the two selected distircts (fig.2).
We have two types of relationships or links between the actors. these links are reinforced by formal or informal contracts:

- The commercial relationships which essentially exist between the direct actors of the different links of the CVA. These are the buying and selling relationships of agricultural inputs and yam cuttings and roots.

- The technical and financial support relationships link the actors of the CVA links with the State services, CIRAPIP, IITA, CeRPA, microfinance institutions The foreign consumers came from Nigeria and Togo,

The foreign consumers include those of Nigeria, Niger, Congo etc. and Beninese living in foreign countries (Europe and France in particular) who don't buy exported boiled yam but fresh yam that themselves boiled and consume.

What is the proportion (percentage) of the crop kept by the farmer for home consumption and what is sold by farmers, and to which markets in (MI Q9 (first), Q16 (Nigeria))

- **Fresh form**
- **Processed form: [product]**
- **Processed form: other products from the crop**

And

MI Q10 (first), Q17 (Nigeria) What is the proportion (percentage) of the crop consumed in urban areas around the market you are situated; in: Fresh form, Processed form: [what product], Processed form: alternative products from the crop.

Table 33: Proportion (%) of crop used in fresh and processed forms (MI Q9 or Q16)

	Designations	DASSA Region		DJIDJA Region	
	Total Quantity of fresh crop used and Sold (tons)	N=67 400		N= 29 700	
	Crop use (home consumption vs sales)	Quantity used (tons)	Percentage (%)	Quantity used (tons)	Percentage (%)
Rural level	Home consumption	11 000	16.32	4 500	15.15
	Sold in fresh form	21 000	31.15	12 500	42.09
	Sold in processed form [Boiled Yam]	1 000	1.48	400	1.35
	Sold in processed form [Pounded Yam]	1 500	2.22	1 000	3.37
	Sold in processed form [Chips]	2 000	2.97	600	2.02
	Sold in processed form [Fried Yam]	400	0.59	300	1.01
Town or Urban level[1]	Home consumption	23 000	34.12	6 500	21.89
	Sold in fresh form	21 000	31,15	12 500	42.09
	Sold in processed form [Boiled Yam]	2 000	2,97	1 000	3.37
	Sold in processed form [Pounded Yam]	4 000	5,93	2 000	6.73
	Sold in processed form [Chips]	500	0,74	400	1.35
	Sold in processed form [Fried Yam]	1 000	1,48	500	1.68

[1] The town level takes account: Dan-Centre, Djidja-Centre, Zinkamin and Bohicon Centre for DJIDJA city and Dassa I and II for Dassa city. Moreover, the quantity of fresh yam sold as at rural as urban level is similar for it's the same producers living in rural areas, who sell at the town level.

In the Dassa region, most traders are women both in the sale of boiled yams and fresh yams. Men are then a minority in the markets selling fresh yam and non-existent in the sale of boiled yam, exclusively dedicated to women. . As for fresh yam, the majority of men give their stock to their women for the market. Most of them are selling at the field thinking that women are more effective in the commercialization of the boiled yam. . The main ethnic groups involved in the sale of fresh yams and boiled yams in this commune are: Idaatcha natives and their majority Mahi neighbors in certain local cities such as ADINHINLIDJI. While the sale of boiled yam is done locally in some of the villages surveyed (Lema, Kpékouté, Adinhinlidji); it is not done in others like IGOHO. Similarly, apart from edge-field sales, which are exceptionally rare, there is only one local market for the sale of fresh yam (Dassa-Centre). But the neighboring city market of Glazoué is another outlet for fresh yam for these actors of Dassa. Very few traders of fresh or boiled yam are also producers but many are wives of producers or resellers. Regarding the proportion of yam sold in different households, it varies according to the ethnic groups and the initial production objectives of the households, their expenses as well as the unforeseen ones related to the production. However, it is noted that the largest proportion (about 65% / 70% of the harvest) is sold in fresh form to travelers or resellers, most of whom go to the cities of Bohicon and Cotonou. Likewise, boiled yam is more sold in rural and peri-urban areas than in urban areas where yam products (crushed yams, chopped potatoes, stew and fried yams) are more widely traded. Thus, for the area of DASSA, according to the gender we retain as in table 34:

Table 34: Proportion (%) of sold crop in Dassa by gender

Male	Female
Few men involved in yam trade Most of traders sell locally (65%) and few of them outside their regions (especially Glazoué and Cotonou) Most of traders (men) are also farmers Some producers sell 50% of what is sold, while the remaining 50% is given to the woman for sale at the market 30% of the harvest is consumed in the household, (60%) sold in fresh form (40% in the Dassa market, 20% sold between Glazoué and Cotonou) Sometimes this 20% is given to women for sale in processed form in neighborhoods and schools (boiled Yam, fried, stew) In urban areas, domestic consumption is around 40% and 60% sold in processed form (Pounded Yam especially)	Most of traders are women Most traders sell as much locally as in the close market of Glazoué especially for the resellers of the markets of Bohicon and Cotonou) Very few traders are also farmers Some producers (husband) charge them to sell 70% of their production in fresh form while 30% is reserved for the domestic consumption of their household Other producers leave 20% for domestic consumption, sell 30% in fresh form to the processors of their locality (sellers of yam pounded mainly) while the other 50% are intended for sale to buyers coming from the big cities of country (especially Cotonou and Bohicon)

At DJIDJA, as at DASSA, most traders are women in the sale of boiled yams and fresh yam. The main ethnic groups involved in the sale of fresh yam and boiled in this commune are only the Fon majority in all village localities. Apart from sales in the field, there are two markets for the sale of fresh yams (DJIDJA-Center and DAN-Center).. But the neighboring Bohicon market of DJIDJA, is another outlet for fresh yam. Very few traders of fresh or boiled yam are also producers but many are wives of producers or resellers. Regarding the proportion of yam sold in different households is related to the initial objectives of production of households but also to the unforeseen situations (transhumant cattle or rats' attacks for example) related to production. Indeed, one of the major challenges for the producers of DJIDJA is the management of the passage of the cattle by the shepherds which is often the source of bad harvests (approximately 50-60% of the harvest) because the animals devastate the field of

yams at the dry season. Then the producers consume a large share of production (approximately 50-60% of the harvest). . However, when money is needed, producers prefer to sell their crop in extenso to solve their problems or invest in other activities. As in Dassa, boiled yam is more sold in rural and peri-urban areas than in urban areas where yam products (pounded yams, chopped potatoes, stew and fried yams) are more widely traded. Thus, the key conclusions to remember by gender are as outlined in Table 35:

Table 35: Proportion (%) of sold crop by gender in Djidja (con't)

Male	Female
10% of the fresh yams are consumed compared to 40% directly sold in the market of the different villages (sellers of pounded yams, boiled or fried yams) and 50% sold to the buyers coming from the big cities (Bohicon and Cotonou in particular) Because of transhumance conflicts and damage caused by livestock, 70% of the yam harvest is divided between domestic consumption and the remaining 30% sold to buyers in large cities (Cotonou and Bohicon)Few men involved in yam trade Most of traders sell locally (about 85%) and some outside (15%) of their regions (especially Bohicon) Of the yam sold, some producers sell 60% while the remaining 40% is given to the woman for sale Sometimes 20% of production is given to women for sale in processed form in schools (fried yams, stew) In urban areas like Djidja centre, Dan Centre, Zinkanmin centre, Bohicon, domestic consumption is around 50% and 35% sold in processed form (pounded Yam), 15% processed in boiled yam.	20% of the fresh yams are consumed as opposed to 10% directly sold in the village markets; 20% sold as boiled yams and the remaining 50% sold to buyers in large cities. Most of traders are women Most traders sell both locally and in markets in other parts of the country (Bohicon and Cotonou) Some of the traders are also farmers Of the portion reserved for consumption, 35% is subject to the preparation of boiled yams and 65% to boiled yams En raison des conflits de transhumance et des dommages causés par le bétail affectant plus de 45% des agriculteurs, environ 55% de l'igname est soumis à la consommation domestique et les 45% restant vendus aux acheteurs des grandes villes (ethnie Fon vivant à Cotonou et Bohicon) ou les transformateurs de la région

***What are the major locations where the boiled yam is processed and marketed? MI Q11 (first questionnaire), Q18 (revised Nigeria)**

Table 36: Major locations for processing and selling boiled yam at DASSA

Male	Female
a) In the DASSA region, the boiled yam is more made and consumed mostly in households b) It is also sold in the market	It is more consumed and sold in the localities of KERE, LEMA, ADJIHINLIDJI and in the DASSA-Centre market, in the schools, in some strategic places not far from the workers (carpenters, welders, etc.) and in the schools. We sell in front of hospitals and police stations Boiled yams are prepared in households most of the time for domestic consumption or for sale and sometimes in the selling areas

Table 37: Major locations for processing and selling boiled yam at DJIDJA

Male	Female
a) In the region of DJIDJA, the boiled yam is more made and consumed especially in the households but also in the market b) It is sold in schools and not far from the workers	a) it is also consumed in households especially in the localities of DAN-Centre, LALO, HANNAGBO, ZINKANMIN, HOUNVI, b) We sell it at markets and in some places often frequented by workers, children and women main buyers of boiled yam (schools, hospitals, police stations and road builders) c) Another part of our market is the IBOs (originally from Nigeria selling bike and car mechanical parts in Benin). d) Boiled yam is often prepared in households most of the time for domestic consumption or sale. But it is also prepared at the point of sale so that to make buyers sure of the quality of the product.

Although women, who are more active in the production of boiled yams, were the most able to answer questions about the places of manufacture, in the DASSA region, boiled yams are more made and consumed mainly in households in the localities of KERE, LEMA, ADJIHINLIDJI (mainly inhabited by the Mahi who are the main consumers of boiled yam in the region) and in the market of DASSA CENTER, in schools, in some strategic places not far from the workers (carpenters, welders , etc.), hospitals and police stations that have not brought meals from home. Thus, they buy from the boiled yam traders to satisfy their hunger of the day. Boiled yams are prepared in households most of the time for domestic consumption or for sale.
But it is also prepared at the point of sale to reassure buyers of the quality of the product.
Likewise at DJIDJA, it is also consumed in the households especially and in the localities of DAN CENTER, LALO, HANNAGBO, ZINKANMIN, HOUNVI, in the markets places and in some places not far from the workers, children and women who are the main buyers of the boiled yams (schools, hospitals, police stations and road builders). Yams are also widely consumed by Ibos (Nigerian ethnic groups living in peri-urban and urban areas to sell motorbike mechanical parts, and who represent a large part of consumers of boiled yam). As in Dassa, boiled yam is prepared in households and most of the time it is intended for domestic consumption or for sale. Here it is also prepared at the point of sale to reassure buyers of the quality of the product.

***What are the demand segments[2] associated with the [product]? (at the applicable level, i.e. community, processing site, city)? MI Q12 (first questionnaire), Q19 (revised Nigeria)**
Concerning the segments of demand related to the boiled yam market, the following gender specific points of view have been made:

[2] Demand segment: a relatively homogenous group of people who consume the product (purchased or made at home) that have a unique set of preferences (e.g. men from Delta region may have particular preferences for boiled yam or very sour, yellow, gari).

Table 38: Demand segments associated with the yam at DASSA

Male	Female
a) In the region of DASSA, the boiled yam is more made and consumed mainly in households b) Some women sell it to us workers and producers but also in schools and in the market	a) Some producers buy from us before going to the field b) Students buy from us c) We also sell to policemen working on the field, hospital patients or their family members coming for visits. d) Our biggest selling market segment is the market women who come to market without bringing a meal from home to market place and their children presents with them on the market place e) Some women sellers said we remain in strategic places not far from the workers (carpenters, welders, etc.), hospitals and police stations. f) The Mahi ethnicity buy boiled yam more than the other ethnic groups. The poor buy than the average rich and rich

Table 39: Demand segments associated with the yam at Djidja

Segments of demand	
Male	**Female**
a) In the region of DJIDJA, the boiled yam is more made and consumed mainly in household b) Women sell it in schools and at the market c) Women also sell to policemen and those who work on our roads in asphalting.	Boiled yam is bought by some households in the village The workers (carpenters, welders, shoemakers) buy from us We also sell in front of hospitals for the patients' visitors and policemen. Women and children are our main clients Similarly, the road builders of the company OFMAS) and the building companies (Satom) Yams are also widely consumed by IBOs (Nigerian ethnicity living in peri-urban and urban areas to sell motorbike or cars mechanical parts). Young singles buy and take it more than married people because they are better able to buy from outside than to prepare at home. The Fon ethnicity buys boiled yam more than the others ethnic groups. The poor buys than the rich and the crafts workers and the civil servants

***What are the demographics of the customer groups / buyers of [product]? e.g. female customers, male customers, youth, high-end restaurants, wealth categories) MI Q22 (first questionnaire), Q30 (revised Nigeria)**

Table 40: Demographics of demand by gender at DASSA

Male	Female
a) Women are the sellers of boiled yams b) However, the households (90%) of the villages take them, as do the workers (70%) and some of the civil servants (15%)	a) Most buyers of boiled yam are men, children, young people under 18, and single people; but women buy more than men at the market places b) The largest buyers of boiled yam are workers (millers, tailors, blacksmiths, etc.), rarely those who work in the offices (civil servants) or who wear a suit. c) The best places to sell are schools and even markets for those who have not prepared before coming to the markets d) Local Mahi buy more boiled yams than other ethnic groups.

Table 41: Demographics of demand by gender at DJIDJA

Male	Female
a) Most sellers of fresh yam or boiled yam are women either at the market or at home for both yams and boiled yams b) Women are better informed than us c) Boiled yam is more popular in rural and peri-urban areas than in urban areas where yam products (pounded yams, chopped potatoes, stew and fried yams) are more widely traded.	e) Most buyers of boiled yams are male (25%), children (50%), single (5%) and local workers, apprentices and their master (20%). f) If Native Fon of the region are the biggest buyers of boiled yams and the biggest market of the locality are Dan-centre and Zinkamin. g) The Fon represent the majority of buyers of boiled yam (70%) and other ethnic groups: Fulani (5%), Mahi (15%), Northerners (10%) h) The largest buyers of boiled yam are workers (millers, tailors, blacksmiths etc.), rarely those who work in offices (officials) or who wear suits e) The best places to sell are schools and in the markets for those who have not prepared before coming to the markets.

***What are these customers demanding (e.g. what crop characteristics are they interested in?) MI Q23 (first), Q31 (Nigeria)**

Table 42: Preferred characteristics of the products for main demographics demands at DASSA

Male	Female
a) Most buyers like yams according to variety (eg Loboko more preferred than Moroko), then comes the size of the tuber and the size of the heaps on sale b) As for boiled yams, for men boiled yams to be appreciated must be warm, presentable, clean, easy to break in the mouth, sweet, soft and pleasant to swallow c) Most buyers like boiled yams according to the varieties (eg Loboko more preferred than Kokoro), then comes the size of the heaps of yam pieces on sale.	a) The good boiled yam is white or yellow after cooking, sticks to the tongue, soft and has a low water content b) Most buyers like boiled yams according to varieties (eg Loboko more preferred than Tchewere, Kokoro), then comes the size of the heaps of cooked yam pieces on sale c) The Mahi, natives of some areas of the region constitute the biggest buyers of boiled yam and they like it well cooked, friable and softened in the mouth, easy to chew and to swallow and prefer like the other ethnic groups (Lokpa, Idaatcha) f) The majority said they like hot, presentable, boiled yam, white and not hard, nor bitter in the mouth g) For some persons, boiled yam can be yellow or white provided it is crumbly, sweet, presentable, not bitter.

Table 43: Preferred characteristics of the products for main demographics demands at DJIDJA

Male	Female
Most buyers like boiled yams according to the varieties (eg: Loboko more preferred than Aklatchi, Kodjewé, Kokoro), then comes the size of the heaps of pieces of yams (that must be big to make us satisfied of the money given to the sellers) on sale All ethnicities have the same opinion regarding the preference of boiled yam to buy The good boiled yam appreciated must be warm, presentable, soft, easy to break in the mouth, sweet and pleasant to swallow	d) Most buyers like yams according to varieties (eg : Loboko more preferred than Gnidou, Kokoro) e) Most of consumers and buyers consider that the quality of the boiled yam according to the prepared variety (eg the boiled yam of the Laboko variety is more appreciated than that made with Gnidou) f) Fon, native of the region, the biggest buyers of boiled yam like it cooked well, friable and softened in the mouth, easy to chew and to swallow. g) For some people, boiled yam can be yellow or white provided it is crumbly, sweet, presentable, not bitter

***What are these customers demanding (e.g. what crop characteristics are they interested in?) MI Q23 (first), Q31 (Nigeria)**

Table 44: 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
Communities level:	Whole Households Men Women married Single Workers (road builders, carpenters, welders, tailors etc.) Agricultural producers Schools (pupils + teachers) Market (sellers, resellers and customers of the market) policemen Patients and hospital visitors Ethnic group (Mahi, Fon, Idaatcha, Ibo from Nigeria) Very few restaurants clients	- Most of those buyers (households, workers, producers, market customers, policemen, hospital customers) appreciate the quality of the boiled yam according to the prepared variety (eg : the boiled yam of the Laboko variety more than it made with Gnidou) - Boiled yam whether it is yellow or white so that it is appreciated, it must be presentable, friable, softened in the mouth, sweet (half sweet-half salty), not hard and not bitter and especially hot - It must be friable to facilitate the pleasure of chewing food and digestion (especially for children who do not know much about varieties) - Customers prefer large heaps of boiled yams to get their fill quickly
Processing site:	Households Workers Market (sellers, resellers and customers of the market)	Buyers (households, workers, customers of the market), appreciate the quality of the boiled yam according to the prepared variety (ex: the boiled yam of the Laboko variety is more appreciated than that made with Moroko variety) and the boiled yam must be presentable, friable, soft, not hard and not bitter.
Wholesale market:	Don't exist	_
Retail market :	Whole Households Men Women married Single Workers (road builders, carpenters, welders, tailors etc.) Agricultural producers Schools (pupils + teachers) Market (sellers, resellers and customers of the market) policemen Patients and hospital visitors Ethnic group (Mahi, Fon, Idaatcha, IBO from Nigeria) Very few restaurants clients	Same description as at community level

As for boiled yam, there is no wholesalers. However, in terms of retail sales, at the village communities level of Dassa or DJIDJA, we retain the following market segments: households, men, young people, women, married, single, workers (road builders), carpenters, welders, tailors, etc.), agricultural producers, students and their teachers, sellers, resellers and customers of the market, policemen, hospitals patients and visitors. In addition, there are very few customers in the restaurants. Although other ethnic groups such as the Lokpa and the Idaatcha consume it the Mahi and Fon are the main ethnic groups consuming boiled yams.

Overall, the characteristics of the boiled yam required by the different segments of the boiled yam market are the same. Most of buyers appreciate the quality of the boiled yam according to the variety prepared unlike children who do not know much about varieties. However, all believe that boiled yam should be crumbly to facilitate the pleasure of chewing food and digestion (especially for children who do not know much about varieties) and also whether it is yellow or white to be appreciated it must be presentable, friable, sweet (half-sweet, half salty) not hard and not bitter and especially hot. In the same way, the size and size of the heaps of pieces of boiled yam for sale means that the customer or the buyer is quickly satiated.

2.3 Characteristics for a high-quality crop

Ranking of characteristics for a high-quality crop per demand segment (MI Q24 original questionnaire, Q32 revised Nigeria)

Table 45: Characteristics of a high-quality crop

Rank	Characteristic	Indicators used for ranking crop characteristics and demand segment they are important for
1	(white-yellow-not red) not blackened flesh	**Colour of flesh**
2	Smooth peel/without hump or thorns Brown peel Cracked/scratched peel Not rough/shaggy/hump peel Thin peel Not crumbly peel little brown	**Colour of the peel** **Presentation or form of the peel** **Touching Sensation of the peel**
3	(not crumbly, thin, rough/shaggy/hump, Cracked/scratched, smooth/free from lumps or thorns)	**Texture of peel**

2.4 Proportion of the crop consumed and sold

***Proportion of the crop consumed by farmers and sold to different customer groups (in percentages) (MI Q13 original questionnaire, Q20 revised Nigeria)**

Table 46: Proportion (%) of the crop consumed and sold by farmers

Customer groups	Region of Dassa Percentage (%)		Region of Djidja Percentage (%)	
	Consumed	Sold	Consumed	Sold
Rural consumers – farmers keeping the crop for home consumption	35	65	45	55
Rural consumers – purchasing the crop for home consumption	15	75	40	60
Household consumers in urban areas / cities	65	35	75	25
Institutions such as hospitals or schools	5	0	10	0
Restaurants	30	5	15	5
Food vendors	10	10	20	10
Others (specify)				

The results show boiled yam is consumed and sold at Dassa while at Djidja, boiled yam is a bit more consumed in the households.

2.5 Consumption patterns of different consumer groups

Consumption patterns of different consumer groups (Q21 Nigeria) This question may not be in each questionnaire.

Table 47: Consumption patterns of different consumer groups

Consumer groups (adapt as necessary)	Rural areas	Urban areas
Men	Colour of flesh Colour of peel Texture of peel	Colour of flesh Colour of peel Texture of peel
Women	Colour of flesh Colour of peel Texture of peel	Colour of flesh Colour of peel Texture of peel
Youth	Colour of flesh Colour of peel Texture of peel	Colour of flesh Colour of peel Texture of peel

2.6 Variations of the product

What are the different varieties/types of the crop demanded? (this may not in each questionnaire)

Table 48: Varieties/types of crop demanded at Dassa

Variety / types of the crop demanded	Order of importance	Reasons why this variety is demanded
Laboko	1	It has a short life cycle l period (6 months). It is the variety of quality, very profitable for resellers (good market value). The selling price is high. It can undergo all processing for yams (pounded yams, boiled yams, chips, couscous, fried yams). The boiled yam obtained from it, is crumbly, sweet, attractive, very white and easy to swallow. But it is expensive and less used by boiled yam processors.
Moroko	2	It is also harvested quickly (8 months) and can be easily preserved. It is the variety which is sold the best after Laboko. And like Laboko, it can undergo all processing s that can undergo the yam. Its root gives several tubers after harvest. Its boiled yam is not as white as Laboko's but is as clean and attractive as Laboko's. It also has good market value.
Kokoro	3	Although it is good in boiled form (soft, yellowish, friable), it is especially good to make the chips. It also has a better market value than those of Laboko and Moroko. It is sold so much faster than the latter. If it's used to make pounded yam, it is mainly used in the manufacture of African couscous (wassa wassa). Retailers especially appreciate it because it is sold faster.
Tchéwéré	4	If it takes 10 months to get to harvest, its productivity is excellent. Laboko's productivity is a matter of luck while Tchewere gives every shot. it is therefore profitable for sale and can undergo all processing for the yam. Although it can be pounded, it is mostly used in its boiled form where it has taste, soft and quite attractive.
Yanrambo	5	Its production time is 10 to 11 months. It is well elastic when it is pounded, very soft and white when it boils, and a small amount boiled gives an impressive amount of finished product. Its production time is 10 to 11 months. It is therefore sold well after harvest.
Aga/Ala	6	These are varieties, very good to boil, friable and white and sweet after cooking. They cost less than the other varieties (for instance, if Laboko costs 400 FCFA/kg, Aga or Ala costs 200 FCFA/kg in September (dry season))

Table 49: Varieties/types of crop demanded at DJIDJA

Variety / types of the crop demanded	Order of importance	Reasons why this variety is demanded
Laboko	1	It is a variety of short period (6 months). It is a sign of prestige because it is the best to welcome visitors and especially under its pounded form. It is expensive and therefore boiling it would be compared to waste. Although subtle to grow and preserve, it has the highest market value of all varieties.
Kokoro	2	Used mainly to make chips and boiled yam, it gives many tubers at harvest, it provides a good income for it is well sold.
Kodjewé	3	It's been more time underground to be mature. After harvest, it gives many tubers and is used for all possible processing of yam.
Kpété	5	Although as good for making pounded yam, it is good for making boiled yam. It is also very soft one, crumbly, attractive and it provides a good after-sales income. It is especially cheaper for its quality. It is mostly used during the period of scarcity.
White Gnidou	6	Its tubers are big and sold well but it is not reliable to make pounded yams but gives a good quality of boiled yam (white, soft, crumbly, easy to swallow). It is cheaper and is used by boiled yam sellers in urban or rural areas.
Ala	7	It is a very good variety for pounded yam. It is a long-lasting variety, good in both pounded and boiled forms and which takes the place of Laboko after the end of the year holidays and which is however less expensive. It is also widely used by boiled yam processors

2.7 Quantities of the crop and product traded

Quantities of the crop and product traded (during a year ; specify from when to when) (MI Q15 original questionnaire, Q23 revised Nigeria)

Table 50: Quantities traded (tons) as fresh and processed by region

	Region DJIDJA Quantities traded (tons/year)	Region Dassa Quantities traded (tons/year)
Fresh crop	About 21 000	About 12 500
Processed [Boiled Yam]	About 3 000	About 1 400
Processed [other products] Pounded Yam	About 5 500	About 3 000
Chips	About 2 500	About 1 000
Fried	About 1 400	About 800

Source : Dassa and DJIDJA markets survey, 2018

What is the daily throughput/amount traded daily in market of the product (in kg or tons), taking seasonality into account? This can only be done for market where the trader(s) are based. (MI Q16 original questionnaire, Q24 revised Nigeria)

Based on responses, make a table for each market with the estimates of the daily throughput crop and product. Indicate the sources of information.

Table 51: Daily throughput/amount traded (kg or tons) in DJIDJA Market

Part of the year	Quantities of crop (tons)	Quantities of product (kg)
Wet season	100	2500
Dry season	180	4500
Planting time	75	2000
Festive periods	240	3500
Time of school fees	270	4500
Other (specify)		

Source : Djidja-Centre market survey, 2018

Table 52: Daily throughput/amount traded (kg or tons) in DASSA Market

Part of the year	Quantities of crop (tons)	Quantities of product (Kg)
Wet season	70	1500
Dry season	120	2500
Planting time	65	1000
Festive periods	195	3000
Time of school fees	180	2500
Other (specify)		

Source : Dassa-Centre market survey, 2018

Transport, storage, and means of selling the crop (MI Q17 original questionnaire, Q25 revised Nigeria)

***What are the important characteristics of the crop associated with product transportation, storage and sale? (MI Q18 original questionnaire), OR During crop/product transportation, storage and sale, what are important characteristics that might affect the product? (Q26 revised Nigeria)**

REGION 1 : DASSA

Yams are transported either on-farm or on the market by means of transport, among which, depending on the importance of the quantity, the main ones are: truck, minibus, cars and the pick-up. Depending on small size of the quantity, rickshaws, bicycles and basins are used for the people having a low income. As for the boiled yam, it is often put in basins and transported on the head by the salesgirls or sales women helped by taxi-motorcycles to their sales place. For transportation items that may affect product characteristics, we can list the key points summarized in the following table:

Table 53: Characteristics of the crop associated with fresh yam and boiled yam transportation, storage and sale at Dassa

Male	Female
a) Even if Yams are heavy, they are easily transported b) Transport in urban areas (Cotonou mainly) need great means of transport (Lorry, Cars, Bus, pick-up) c) Hurt yams under heat can lead to losses and more the storage is long, more the losses will be. d) The majority said that the yam must just be mature and non-injured regardless of its variety so that its transport or storage is not problematic	e) The majority said that the yam must just be mature and not injured, whatever its variety, so that its transport or storage is not problematic f) The sale of boiled yam must be done in a cooler or in a basin covered with plastic bag and loincloth to keep it warm and prevent it hardening to the displeasure of buyers g) The boiled yam cannot be stored until the next day because even heated the next day, it loses its texture (soft and tender), it has an unpleasant odor, is bitter and hard to chew. h) Prepared boiled yams must be fully consumed the day they are cooked or they are lost forever .

Table 54: Characteristics of the crop associated with product transportation, storage and sale at DASSA

In this region, as in Dassa, the yam is transported either on-farm or on the market by means of transport, among which depending on the quantity is important, the main ones are: truck, minibus, cars, and pick-up. Depending on the quantity is weak, rickshaws, bicycles and basins are used for the poor. As for the boiled yam, it is also often put in basins and transported on the head by the salesgirls and can help taxi-motorcycles at the place of sale. For transportation items that may affect product characteristics, we can list the key points summarized in the following table:

Table 55: Characteristics of the crop associated with fresh yam and boiled transportation, storage and sale at DJIDJA

Male	Female
a) Even if Yams are heavy, they are easily transported b) Transport in urban areas (Cotonou mainly) need great means of transport (Lorry, Cars, Bus, hatch) c) Hurt yams under heat can lead to losses and more the storage is long, more the losses will be. d) Majority said that yam must just be mature and non-injured regardless of its variety so that its transport or storage is not problematic	e) The transportation of yam is not a big problem, as is its conversation like market gardening products or cereals f) However, the majority said that the yam should just be mature and non-injured regardless of its variety so that its transport or storage is not problematic. It must be removed from the water and protected from rain during transport to prevent it from rotting. It should also be avoided in hot compartments. g) The sale of boiled yam should be done in a cooler or in a basin covered with plastic bag and loincloth to keep warm and prevent it hardening to the displeasure of buyers

Male	Female
	h) The boiled yam cannot be stored overnight because even heated the next day, it loses its texture (soft and tender), it has an unpleasant odor and is hard to chew. i) The prepared boiled yam must be consumed completely the day it was cooked or is lost forever. j) The greater the distance from the place of preparation of the boiled yam to the place of sale, the greater the risk of cooling and hardening of the goods k) Similarly, the outbreak of conflict between pastoralists and farmers causes the yam price to rise and may delay the transport of the product to its place of sale and induce its rot or the hardening of boiled yam for example.

Table 56: Means of transportations, Daily throughput/amount traded daily (kg or tons) in Djidja and Dassa centres markets

	Means	Important characteristics of the crop associated with product transportation, storage and sale OR Important characteristics that may affect the product
Transportation	Truck Minibus Cars Pick up	- Even if Yams are heavy, they are easily transported - Transport in urban areas (Cotonou mainly) need great means of transport (Lorry, Cars, Bus) - Hurt yams under heat can lead to losses and more the storage is long, more the losses will be. - Transport in urban areas (Cotonou mainly) is made with Lorry, Cars, Bus, hatch. - Hurt yams under heat can lead to losses - Majority said that the yam must just be mature and not injured whatever its variety so that its transport or storage is not problematic - The duration of transport affecting the yam varies according to the heat of the sun. So, fresh yam transport must not exceed three months in trucks (more airy) and 3 days in cars (less aerated). - The yam transport does not affect the quality of the yam boiled except when the yam is spoiled
	Bicycle rickshaw	These means are used for a short distance only and it affects the yam (it bakes and rots) only if it is frequently transported under the sun and delivered to the store

	Means	Important characteristics of the crop associated with product transportation, storage and sale OR Important characteristics that may affect the product
Storage	- field - store	- Yam is stored in the fields by men under the leaves to protect them from heat and prevent them so that they and cannot give poor quality of boiled yams (spoiled and bitter) - Yam is stored by wholesalers (some men but especially women) in stores after sale in the fields (by producers) - The storage period in stores can go up to 1 year but already from 6 months, some begin to spoiled, others grow seedlings. Those spoiled are discarded, those that generate seedlings, do not alter the good quality of the boiled yam. - However, the yam put under the sun all day and returned to the store may soon spoil that those remained in the shade at the store. -When the rain catches the yams during the transport, on the arrival the seller must dry them in the sun and find to sell them as quickly as possible without the storage does not exceed the week. Otherwise they rot quickly cannot be used for boiled yam
Means and forms of sales	- Edge-field (Wholesale, Retail) - Market (Wholesale and Retail)	Yams covered by leaves in the field will rot only if there is water at the place where they are put, such as rats. The boiled yam from the affected yams contain enough water to cook but those attacked do not affect the quality of the boiled yam

Drivers of change in terms of demand for crop and final product (MI Q20 original questionnaire, Q28 revised Nigeria)

Table 57: Drivers of change regarding demand for product in general, major characteristics of product at DASSA

Male	Female
a) Currently there are many taxes on foodstuffs than before b) Boiled yam and fresh yam are more in demand during the long dry season (December-March) and the short dry season (August), c)Demand is also stronger during the holidays period (Christmas, new year; Easter)	a) The price of packaging can increase from 1000 FCFA package 1000 to 3000FCFA, so the cost of the yam dish can go from 150 to 200 FCFA. b) Boiled yam and fresh yam are more in demand during the long dry season (December-March) and the short dry season (August), yam harvest season

Male	Female
d) But also if the price of fuel and gasoline have increased, the prices of labor, the costs of transporting the market to the market and the purchase price of fresh increase and that of boiled yam too. e) One of the actors estimated the transport at 1,500,000 in a period of abundance and at 200,000 CFA during the lean season.f) However, the more the variety is big and good to boil, the more expensive it is g) With the damage done by transhumant pastoralists from the North, the harvests are not always good, so the yam and boiled yam are expensive sometime at harvest	c) The demand is also higher in festive period d) However, more yam variety is big and good to boil, more expensive it is

Table 58: Drivers of change regarding demand for product in general, major characteristics of product at DJIDJA

Q27 : Drivers of change regarding demand for product in general, major characteristics of product	
Male	**Female**
a) Currently there are more taxes on foodstuffs than before. There are no sales b) Boiled yam and fresh yam are more in demand during the long dry season (December-March) and the short dry season (August), and the yam harvest season c) The demand is also higher in festive period (Christmas time, New year, Easter) d) However, the more yam variety is big and good to boil, the more expensive it is. e) With the damage done by transhumant herders from the North, harvests are sometimes not good, so the yam is expensive at harvest and the yam boiled consequently also.	f) The further the distance, the transport of the boiled yam to the place of sale is far, the more expensive it is. g) In the same way, the more expensive the accompaniment of boiled yam for sale, the more expensive the dish is (accompanying spaghetti, and frying more expensive than that with peanut oil or simple palm) h) Unlike yam, which has a higher price in the rainy season, boiled yam keeps a relatively constant price over the year thanks to the availability of good boiling varieties throughout the year (Ala, Kpétè, Yarambo, white Gnidou.) i) With the damage created by transhumant cattle-breeders from the North, the harvests are sometimes not good: which leads to cut the boiled yam in finer cut to sell at the same price j) If in abundance period, the heap of yam is estimated at 2500 FCFA during the lean season it goes to about 5000 FCFA.

	Crop	End-product
Demand in general	Demand for yams is very high but sales are decreasing because of taxation on foodstuffs. However, the transport of yam to urban cities is easier with fewer taxes paid on the roads.	The sale of boiled yam is not taxed but the equipment for the preparation is today more expensive than five years ago resulting in the reduction of the quantity sold to customers. Also, we have fewer people selling boiled yams.
Changes as far as major characteristics of the crop or end-product are concerned	As far as characteristics of the crop are concerned there is no change about them. Consumers always prefer big yams and the varieties which can be processed into boiled form (soft, yellowish, crumby).It is especially good to make the chips, fried and pounded yam. Nevertheless, yams contain less water in dry season. But the consumers prefer varieties like Laboko. Boiled Yyam processors prefer those less expensive to make more profit. About Boiled yam, the characteristics preferred are the same during the whole year : sweet, crumbly, Soft (easy to chew) and attractive	

2.8 Economics of the product

Economics of the product, in terms of (MI Q19 original questionnaire, Q27 revised Nigeria)

a) price, by season, and trends over the last 10 years; for budget calculations try and use average prices and costs for the last 4 months.

Table 59: Price by season, and trends over the last 10 years

Areas	Period and Trends	Trends Over the last 10 Years		Trends over the last 4 months	
		Quantity	Price/ Cost (FCFA)	Quantity	Price/Cost
Urban	Period of Yam Abundance	0.5 kg/1 plate	100	0.5 kg/1 plate	150
	Period of Yam scarcity	0.5 kg/1 plate	125	0.5 kg/1 plate	200
Rural	Period of Yam Abundance	0,5 kg/1 plate	75	0,5 kg/1 plate	100
	Period of Yam scarcity	1 kg/1 plate	100	1 kg/1 plate	150

While prices have risen in recent years, the quantity of boiled yam has decreased because of the raw material price increase which in 2012 was FCFA 250/kg but which today varies between 330 FCFA and 450 FCFA (INSAE, 2015; Djidja-Centre market survey, 2018). The variability of these variables is therefore a function of the periods of abundance (from September to November and from February to April generally) and the period of scarcity (from May to August, from December to January) for the variety Laboko especially. The sellers of boiled yam, who cannot influence the selling price of their product to consumers, reduce the

quantities so that the product does not seem too expensive in the eyes of consumers. However, they affect the yam varieties to maintain their profit margin knowing that the varieties follow one another according to the seasons. The yam is almost always available except the months of May, June and July (small rainy season) when it is rare.

b) Cost of elements in the value chain per kg or tonne? (e.g. transport, packaging, taxes, loading, off-loading, stallage rents etc.) profitability of the crop? (i.e. gross income minus costs, or % of profit margin as a share of gross income); this can be calculated after the interview has taken place, e.g. during the recap of the session or in the office. Also, if the information for this question is available in another, recently conducted study, then it's better to extract it from there and quote the source.

Depreciation of equipment used in each production (1)

The depreciation in the following table is calculated per year in order to reduce the annual equipment depreciations to their frequency values and to calculate a realistic production cost which takes into account that it is not every day that there is production.

Table 60: Depreciation of equipment and property, plant and equipment

a- For seller in rural area

Designations	Life time (year)	Quantity	Unit Price (FCFA)	Amount (FCFA)	Depreciation/ year
Cooking Pot	5	2	7500	15000	3000
Basin	5	2	2500	5000	1000
Traditional fireplace	2	1	1000	1000	500
Dishes	2	24	5500	5500	2750
Fork/spoon	2	20	100	2000	1000
Duster	1	2	100	200	200
Bucket	2	1	800	800	400
Cup	2	2	300	600	300
Knife	2	2	500	1000	500
Stool	5	1	1500	1500	300
Ladle	3	2	500	1000	333,33
Total				33600	10.283

b-For seller in urban area

Designations	Life time (year)	Quantity	Unit price (FCFA)	Amount (FCFA)	Depreciation/year
Cooking Pot	5	2	10000	20000	4000
Basin	5	2	3000	6000	1200
Modern Fireplace	2	1	5000	5000	2500
Dishes	2	24	5000	5000	2500
Fork/Spoon	2	30	100	3000	1500
Duster	1	2	100	200	200
Table	5	1	5000	5000	1000
Cup	2	4	250	1000	500
Bucket	2	2	500	1000	500
Knife	2	2	800	1600	800
Bench	5	2	5500	11000	2200
Stool	5	2	1500	3000	600
Ladle	3	2	500	1000	333.3
Total				62800	17 833

Operating accounts of the different productions (2)

- *Profitability has been evaluated frequently during the survey. Tables 53-a and 53-b present the operating account (for a processing-carried out or daily production) of the boiled yam. The boiled yam in rural area is the first product of which the profitability will be evaluated. The following will be that of the seller of boiled yams in urban area. For that, some key elements are namely:*
- *It is produced on average six (6) times / week during periods of abundance and three (3) times during periods of scarcity.*
- *The amount of boiled yam produced per day is 30 kg in times of abundance and 20 kg in times of scarcity.*
- *One kg of fresh yam gives 1.3 kg of boiled yam. The quantity of boiled yam produced is 39 kg for 30 kg of fresh yam processed (6 months of abundance) and 26 kg (6 months as period of scarcity) for 20 kg processed which equal to 32.5 kg the average annual quantity of boiled yam produced*
- *The variety Laboko is produced in one month (September because it is less expensive) and the other varieties commonly used such as Ala, Kodjèwé, Kpètè, white Gnidou etc. (because they are less expensive than Laboko) are produced the other 11 months of the year. Thus, the average annual quantity produced is 162.5 FCFA/kg/month.*
- *During this period, 100 kg of Laboko is sold at 25,000 FCFA in September, or 250 FCFA per kilogram, and the other varieties are sold on average at 15,000 FCFA, or 150 FCFA per kilogram. Thus, the average annual price of fresh yam is 162.5 FCFA.*
- *The transport for the supply of fresh yam is 600 FCFA on average for the rural processors and 1000 FCFA for those of urban areas.*
- *The sale of 1kg of boiled yam is 300 FCFA in a period of abundance and 350 FCFA in period of scarcity; in urban area. The price in a period of scarcity is 350 FCFA for the sellers of rural area; and 400 FCFA for those in urban area in times of scarcity. Thus, the average*

selling price of boiled yam for rural processors is 325 FCFA and the average selling price for urban processors is 375 FCFA.

- *The total depreciation is the one calculated above based on equipments used by each saleswoman for her production. Thus, this latter divided by the total production frequency equals to the daily production depreciation.*

Table 61: Calculation of the frequency or daily profitability (processors and saleswoman in rural area)

Topics	**Unit of mesure**	**Quantity**	**Unit Price (**FCFA)	**Amount (**FCFA)
Return				
Turnover Boiled Yam	Kg	32.5	375	12187.5
Sub-total 1				12187.5
Variable Costs				
Fresh Yam	Kg	32.5	162.5	5281.25
Water	L	100	100	100
Transport	Km	3	250	750
Packing bag	m^2	2	300	600
Firewood	Unit	8	500	500
Matches	Box	1	25	25
Detergent "Klin"	Bag	1	100	100
Pepper	Gram	500	300	300
Salt	G	100	25	25
Onion	G	600	400	400
Oil	L	20	300	300
Sub-total2				**8 381**
Fixed Costs				
Product	**Total of production frequency (1 year)**		**Total Depreciation (FCFA)**	**Daily production depreciation (FCFA)**
Boiled Yam	216	1	10283	47.6064
Casual Labor				
Hired labor	**Number**	**Salary (FCFA)**	**Frequency**	**Amount (FCFA)**
Family labor force	1	500	1	500
Tax				100
Sub-total3				**600**
Total Expenses (variable+fixed cost)				**8 929**
Gross Margin (revenue-charges variables)				**3 806**
Net Income (Return-charges totales)				**3 259**
Rate of return (net income*100/total expenses)				**36.50%**

Table 62: Calculation of the daily profitability (processor and saleswoman in urban area)

Topics	**Unit of mesure**	**Quantity**	**Unit Price (**FCFA)	**Amount (**FCFA)
Return				
Turnover Boiled Yam	Kg	32,5	450	14 625
Sub- total1				14 625
Variable Costs				
Fresh Yam	Kg	32,5	175	5687,5
Water	L	100	100	100
Transport	Km	3	350	1050
Packing bag	m^2	2	300	600
Firewood	Unit	8	500	500
Matches	Box	1	25	25
Detergent "Klin"	Bag	1	100	100
Pepper	Gram	500	500	500
Salt	Gram	100	50	50
Onion	Gram	600	500	500
Oil	L	1	500	500
Sub- total2				**9 613**
		Fixed Costs		
Product	**Total Production frequency (1 year)**		**Total Depreciation (FCFA)**	**Daily production depreciation (FCFA)**
Boiled Yam	216	1	17833	82,56018519
Casual labor				
Workers	**Number**	**Salary**	**Frequency**	**Amount**
Worker	1	500	1	350
Family Labor Force	1	500	1	500
Tax				100
Sous total3				**950**
Total Expenses (variable+fixed costs)				**10545**
Gross Margin (Return- variable expenses)				**5013**
Net income (Return- total expenses)				**3930**
Rate of return (net income*100/ total expenses)				**38.69%**

In summary, the results reveal that the financial profitability of the sale of Boiled Yams seems similar in urban as in rural areas (36.5 % vs 38.69%), although sales in urban areas are slightly more profitable. Indeed, processors and traders of boiled yam in urban area are 1.5 times more crowded in terms of customers than those in rural areas. And so, the costs as well as the rate of return of these actresses in urban areas would be effective (real) if they are multiplied by that coefficient 1.5. Thus, by consequently assigning this multiplier to the rate of return of the processor and trader operating in an urban area, it would be equal to: 38.69 (1.5) = 58.035 %. Finally, the sale of boiled yam in an urban area is then more profitable than that in a rural area (58.035 % > 36.5 %)

2.9 Conclusion

Provide bullet points or text on important findings and their implications for WP2 and breeders. The important findings for WP2 are the six (06) main characteristics related to yam regarding all its three steps or forms (Cf. Table 24 on overview of yam tuber quality characteristics and its behaviour during processing into boiled yam, product profile report and Market study)

A / Raw Material

1/ peel without hump or thorns
2/Brown peel
3/ scratched peel
4/Thin peel
5/Not crumbly peel
6/ white flesh

B / Before and During Cooking

Preparation steps	Peeling	1) Easy to peel 2) Stick to fingers 3) White
	Boiling	1) Attractive (Keep the white or little yellow colour) 2) Good smell of yam with all steam up 3) easy to break with hand or fuck 4) sticky 5) Soft 6) little sweet

C / Final Product

Boiled yam	1) White 2) attractive 3) Soft (easy to chew) 4) Crumbly (easy to break), 5) swell 6) little sweet

The producers also prefer the varieties of short periods (5/6 months for maturity). Similarly, it is preferred by these that the variety is thick with large tubers at harvest and gives the opportunity to make all the changes that can undergo the yam. It is about the pounded yam (elastic), boiled yam (white, soft, crumbly, attractive, softened to the touch, easy to swallow, not bitter), chips, fried yam, sweet and crumbly.

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