

Participatory Processing Diagnosis of Pounded Yam in Nigeria

Understanding the Drivers of Trait Preferences and the Development of Multiuser RTB Product Profiles, WP1, Step 3

Iwo, Nigeria, October 2021

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<u>Ethics</u>: 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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ABSTRACT

Sensory characteristics are key determinant factors to consumer preference for food products especially pounded yam. These food quality preferences varies across gender, region and several socioeconomic factors based on the quality characteristics/attributes in food such as pounded yam.

In pounded yam, the quality attributes are outcome of the processing/preparation procedure which is essential to the final sensory attributes of pounded yam. The objective of this activity was to conduct participatory processing demonstration for pounded yam in order to understand processors' demand for quality characteristics of yam, while processing different varieties with various technological properties. This activity identified the key processing unit operations important in the quality of pounded yam, with different quality characteristics and sensory properties among a group of processors in selected areas in Osun State, Nigeria.

The study area were purposively selected for the processors' demonstration activities and the prominent pounded yam processors in the selected study area who consented to participate in the study were recruited for the demonstration exercise. Ten different yam varieties used for the processing demonstration were all landraces chosen and purchased by the processors. These varieties had variable food quality attributes ranging from the most suitable or preferred varieties described as best for preferred quality pounded yam to the less preferred varieties for pounded yam.

Six willing and available processors participated in the processing demonstration in all the selected communities. Among the varieties used Jibo; Efuru; Lasinrin; Gbongi; Atoja were the preferred yam varieties for good quality pounded yam and Odo, Okun, Ewura; Gbongi-kamilu being the less-preferred varieties. Lasinrin had the highest average tuber weight and % peeling yield among the chosen varieties with Awana having the least values. The average peeling time per variety shows Lasinrin having the highest peeling time and Atoja the least. The cooking time highest in Jibo and least in Gbongi-kamilu. The average pounding time varied among the varieties with Jibo and Lasinrin taking longer time than Ewura with the shortest pounding time. Processors select the yam varieties they use based on visual recognition of the yam varieties and their agronomical and postharvest characteristics. To some of the processors, when the water content of the yam tuber is very high, it enhances ease of peeling however, the indication or implication means that such yam will not be good for pounding. According to the processors, high quality raw material for pounding yam are white in colour or retained the flesh colour throughout the processing procedures and are smooth, stretchable and not lumpy when pound. Some processors use the cooking water to pound while most others simply use cold water.

The processing steps that may easily alter the quality or make a poor quality of the final product, pounded yam if conducted badly as mentioned by the processors include peeling and cooking (too much water while cooking and over cooking) and the pounding process.

Key Words: pounded yam, participatory processing, processing diagnosis, local processing methods, characteristics, Nigeria





1 STUDY CONTEXT AND GENERAL OBJECTIVES

Pounded yam is a highly priced and important African food which is often consumed with soups such as egusi, okro, efo riro, ogbono, among others depending the choice and culture difference. Divers sensory attributes such as texture, plays major role in its acceptability which in turn gives economic value to the product. Quality traits in pounded yam varies across gender and region which influences the food quality preferences. The indigenous preparation of a quality pounded yam product with smooth, attractive dough consistency, is very laborious and tedious.

Consumer preference for pounded yam is influenced basically by sensory characteristics which can be an outcome of various factors such as agronomic, postharvest and the processing. Though the first two afore mentioned can affect the outcome of the characteristics of pounded yam, the latter, which is the processing/preparation, contributes largely to final sensory attributes/features of the pounded yam. Effective peeling and cooking, pounding strength among others gives the quality attributes and these processing steps varies among processors, irrespective of gender, and regions.

The objective of this activity was to conduct participatory processing/preparation demonstrations for pounded yam in order to understand processors' demand for quality characteristics of yam, while processing different varieties with various technological properties. This activity identified the key processing unit operations important in the quality of pounded yam, with different quality characteristics and sensory properties.

In order to evaluate the processing ability of different yam varieties with a group of processors in selected areas in Osun State, Nigeria, several parameters were measured at each processing step of pounded yam preparation. This was carried out to assess the technological properties of each yam variety by conducting participatory demonstrations and consultation with the processors to collect their opinions and views on the different quality characteristics of yam varieties associated with the different processing/ preparation steps or practices.

2 **METHODOLOGY**

2.1 Study area

The study area purposively selected for the processors' demonstration were Iwo, Oluponna and Ileogbo communities which are under Ayedire Local Government Area in Osun State, Nigeria. The state is situated in the South-western region of the country, Nigeria, with Ile-ogbo being the headquarters of the present Ayedire Local Government Area of Osun State in Nigeria and about 4KM from Iwo, the seat of Iwo Local Government of Osun State. The prominent pounded yam processors in the selected study area who consented to participate in the study were recruited for the pounded yam processing/preparation demonstration exercise.







The coordinate of the selected area of study in Osun State is 7°34'00.0"N 4°14'00.0"E.

2.2 Raw material choice

The choice of raw material: Yam varieties used for this survey were purchased within each locality, by the processors. The varieties chosen by each processor ranged from the most suitable or preferred varieties described as best for preferred quality pounded yam to the less preferred varieties for pounded yam. Three to five different varieties were chosen by each processor to have wide variability among the quality characteristics of the yam and to make known the important variances in the processing ability and quality of pounded yam. Some varieties chosen were common to all the processors as seen in table1 below.

All the yam varieties chosen by the processors are landraces that are available in the local market and grown by farmers within the region. The varieties are mostly white fleshed yam tubers which are perceived by the processors to produce a range of good to poor quality pounded yam.

S/N	Processor/Location	Yam varieties of	ies chosen					
		Variety 1	Variety 2	Variety 3	Variety 4	Variety 5		
1.	Olunike Opawumi/ Oluponna	Gbongi	Jibo	Gbongi kamilu	Atoja	-		
2.	Olusogo Idowu/ Oluponna	Gbongi	Gbongi kamilu	Lasinrin	Ewura	-		
3.	Kudirat Tijani/ Oluponna	Gbongi kamilu	Odo	Efuru	Okun	Atoja (didn't get to process because of time		
4.	Olaide Amoo/ Iwo	Odo	Gbongi kamilu	Efuru	Okun	-		
5.	Titilayo Akanji/ Ile-ogbo	Efuru	Lasinrin	Ewura	-	-		
6.	Chief Mrs. Samirat Bamigbayan/ Ile-ogbo	Jibo	Gbongi	Awana	Ewura	Odo		

Table 1: List of yam varieties chosen by the recruited processors in selected areas of Osun State for the study









Gbongi

Lasinrin



Gbongi Kamilu

Plate 1: Pictures of some D.rotundata varieties used for processor's demonstration

2.3 **Product profile processing**

The processors chosen were known in the community for making high quality pounded yam. These were recruited for the processing demonstration in their respective 'bukateria'. Both the processing demonstration and interview with the processors were carried out simultaneously with their permission. This is because most of the processors have several customers trickling in requiring their attentions hence prefer to answer the questions as the demonstration was ongoing... "e ma bere ibeere yin bayi naa". This is the reason why some processors were not willing to participate as they see the exercise as a disturbance to their sales. It also makes it difficult to bring processors together in a place as sales goes on from morning till evening.

The approach adopted was participatory as the investigators were also involved in the pounded yam processing. This enabled each of the processors to demonstrate the processing procedure and identify the quality characteristics of most importance in pounded yam which formed the basis for development of pounded yam product profiling. The processors identified and purchased the yam varieties by themselves from the open market at their various locations. Explanations and answers were given at each processing stage while the team took notes of the various weight recordings and other measures such as peeling time etc.

Six willing and available processors eventually participated in the processing demonstration. Each processor after processing demonstration, assessed the quality characteristics of the different varietal products from the demonstration activity.





3 RESULTS

3.1 Raw Material Characteristics

Among the processors in all the selected communities, ten varieties were used during the participatory processing demonstration activity. The prominent and most common/appeared variety is Gbongi (used by 3 processors), Odo(3), Efuru(3), Jibo(2), Gbongi kamilu(4), Lasinrin(2), Ewura(3), Awana(1), Atoja(2) and Okun(2). These varieties ranged from the suitable to less suitable varieties for pounded yam production with all being landraces. A tuber each of the various varieties across processors demonstration was used. Parameters across processors per variety is hereby reported below.

3.1.1 Weight of yam tubers

The average weight of each yam variety [Gbongi (used by 3 processors), Odo (3), Efuru (3), Jibo (2), Gbongi kamilu (4), Lasinrin (2), Ewura (3), Awana (1), Atoja (2) and Okun (2)] used in this processing demonstration is presented in the graph below. The average weight of each yam variety used in this study is as presented in figure 1. The yam variety with the highest average weight is Lasinrin, weighing about 1.73kg followed by Efuru with average weight of 1.28kg.



Figure 1 Weight average (kg) of yam tuber for each variety under study

Plate 2: Picture showing yam tuber weighing



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3.1.2 Qualitative information collected on the raw material

The characteristics of the variety normally adopted for use in making pounded yam as mentioned by some of the processors includes white fleshed yam, not too hairy tuber while some prefers the ones with smooth appealing skin, straight yam tubers for ease of peeling, no colour change when it is peeled, low water content, long, not too big, dark coloured skin.

3.2 Product Profile Process Description



3.2.1 Unit operations of product profile process

Figure 2 Flow diagram of pounded yam process

3.2.2 Unit operations characterization

The details identified that indicate that yam will give a high good quality pounded yam along each step of the process during the processing demonstration is as discussed below.





Peeling

Peeling loss

The peeling loss varied from 7.00 to 35.00% (w.b), with notable differences between the 10 yam varieties (Figure 3). It was discovered that the thickness of the peel differ across the yam varieties and also some varieties are smooth skinned while others are rough with spikes which added up to the peeling yield.

The yam variety with the highest peeling yield was Lasinrin followed by Ewura and then Gbongikamilu with 35.00, 26.67 and 21.25% respectively. The variance in the peeling yield could be attributed to shape, postharvest storage/handling and morphology of the purchased yam varieties.



Figure 3 Peeling loss (% w.b.)



Plate 3: Peels from various yam varieties

Peeling yield

The peeling yield of the landrace varieties chosen by the processors is presented in figure 4. Tuber size, the state of freshness, peel thickness all contributed to the peeling yield of the purchased varieties. The variety with the highest peeling yield was Gbongi-kamilu.







Figure 4 Peeling yield (% w.b.)



Plate 4: (a) yam peeling using knife, (b) the peeled tuber being weighed





(b)

Plate 5: (a) yam tuber maintaining white flesh colour after peeling while (b) yam tuber having colour change after peeling

Peeling productivity

The peeling productivity of each variety used in this processing demonstration varied. Peeling separates all the hairs, spoilt portions, and spikes from the flesh. The processors reiterated that when the raw yam tuber is too soft while peeling, it may not be good. It was also mentioned that the peeling can also affect the smoothness of the pounded yam i.e. if the yam is not properly peeled, the pounded yam may not be smooth enough due to the presence of has spikes from the tuber.

Assessing by the colour change in the yam (not getting dark as yam is peeled) peeling time across and within the various yam varieties as well as the processors. The peeling time can affect the colour of the resultant pounded yam because if the yam changes colour during peeling it may reduce the preference of the pounded yam by consumers. The length of exposure between peeling and cooking can also affect the colour change. The variation in the peeling time of the yam varieties could be affected by ease of peeling, how sharp the knife used in peeling is and the swiftness of the processor in peeling the yam. The ease of peeling was also attributed to the water content of the yam tuber. The higher the water content, the easier it is to peel.

Also, the different varieties had a wide range of peeling productivity i.e. the kg of raw material peeled per hour by one processor (kg/hour/pr.). Among the varieties across processors as seen in Fig. 5 below, Atoja had the least peeling productivity while Ewura had the highest value for the peeling productivity. Gbongi and Gbongi-kamilu had very close peeling productivity while Lasinrin had the least peeling productivity following Atoja.



Figure 5: Average peeling productivity per yam variety



Plate 6: Picture of peeled raw yam in chunks



Washing

The processors prefer clear water not cloudy or whitish or slimy wash water. This is because of the belief that yam variety with clear water tends to produce quality pounded yam in terms of the colour and appearance. In the pictures presented below in plate 7, colour change was observed in some yam varieties which was slimy and brown in colour. This colour change is believe to reflect in the pounded yam thereby reducing its aesthetic value in terms of appearance.

Plate 7: Pictures of yam water and (right) clear, non-slimy water

washing with (left and middle) slimy

Cooking

The cooking time and texture varied among the yam varieties. The cooking time was measured from the moment the yam was put on the fire to cook, till the period it was ascertained cooked. This was noted by using knife to cut through one or two pieces of yam while still on fire. The Yam must cook very well and must not absorb too much water hence the cooking time is important. When the cooking time is too long or when the yam gets burnt, it will affect the quality of the pounded yam hence too long cooking time and too much water are very important factors during cooking of the yam. The average cooking time per variety is presented in figure 6. However, it was observed that the energy source for the cooking either (wood or gas) can affect the cooking time. If the firewood is not properly dried, it will increase the length of time to cook the yam and this may eventually affect the quality of the pounded yam because the pounded yam may absorb too much water and become overcooked or soggy. Thus the pounded yam will be too soft and unacceptable by the consumers. The yam variety with the least average cooking time is Gbongi-kamilu with 22min18secs followed by Atoja and Efuru with 24mins49secs and 24mins51secs respectively. Jibo had the longest cooking time of 32mins13secs.







Figure 6: Average cooking time across yam varieties



Plate 8: Pictures of boiled yam from *D. alata* (left) boiled yam from *D. rotundata* (right)

Pounding

Ease of pounding of the pounded yam was described as ability of the boiled tuber to form a dough easily and not running round in the mortal - it is one of the characteristics of a good yam for quality pounded yam though the strength, intensity of pounding applied and how fast the processor can be, are important during the pounding stage. Some varieties becomes too soft, not mouldable, less sticky no matter how hard it is pounded because of the morphological characteristics (e.g. water yam – Ewura, Gbongi-kamilu). All these corroborates to the length of time that will be spent in pounding such variety. Below is a presentation on the pounding time and variety in fig 7. Ewura had the least average pounding time followed by Odo and Gbongi-kamilu with 3mins28secs, 5mins4secs and 6mins51secs respectively. Lasinrin and Jibo had the highest average pounding time with no significant difference in the time with Lasinrin having 12mins15secs and Jibo with 12mins14secs.



Figure 7: Average pounding time per yam variety





Plate 9: Pictures of pounded yam (yellow variety left and white variety middle) male processor pounding yam (right)

3.3 Processors' appreciation of end-product

Colour		Textural	Taste		Flavour		
High	Poor	High quality	Poor	High	Poor	High	Poor quality
quality	quality		quality	quality	quality	quality	
White;	Dark/gets	smooth, stretchable,	does not	sweet in	bland	Sweet	Unappealing
butter	darker as	does not get lumpy,	stick	the	taste;	smell	smell
colour;	long as it	soft but doesn't get	together	mouth;	bitter		
yellow	stays	too soft, stick	neither is it	smooth	taste		
colour;	-	together/mouldable	mouldable	in the			
light			or stretchy;	mouth;			
yellow;			no matter				
-			how hard				
			you pound,				
			its lumpy;				
			sticky to				
			the hand;				
			too soft;				
			hard;				
			marsh				

3.3.1 End-products descriptors

3.3.2 Preferred and non-preferred varieties

The processors' preferred and non-preferred yam varieties for pounding yam as mentioned in this study is listed below

Preferred yam varieties	Non-preferred varieties
Awana; Jibo; Efuru; Lasinrin; Gbongi; Atoja	Odo, Okun, Ewura; Gbongi-kamilu

Yam is seasonal and the less preferred varieties that produces a poor quality pounded yam during its season can later be preferred for pounding yam in dry season when such is stored of left in the soil for a longer period before it is harvested. This is because the water content would have reduced and dry matter content improved hence producing a good quality pounded yam.

Jibo is one of the most preferred variety for pounding yam. It is referred to as a good yam as it stretches when pound and gives the desired textural quality of pounded yam with good mouth feel and ease of swallowing. 'When used for pounded yam, it makes one want to eat more'. Likewise Awana, to some is the best for pounding yam. The skin is different, smooth. Awana is not too soft, has low water content and high dry matter as compared to other varieties. Its pounded yam has good mouth feel, appealing in appearance and 'good hand feel' – stretchable, without lumps 'except when it is not properly pound'. Out of the varieties, it is very stretchable.





Gbongi is another variety that makes a high quality pounded yam. The yam flesh is white in colour and maintains it colour through processing and consumption. Its pounded yam is sweet to taste, stretchable and comparable with that of Jibo. Gbongi is mouldable, swells during pounding and takes in more pounding water.

Efuru is another good yam that gives high quality pounded yam. It is hairy with thorns and appealing. It is good for pounding in all season. It does not change colour, not too soft and not lumpy. It is white and stretchable. It takes in more water when pounding 'else it will become hard with time'. 'It is gives less stress and fast to pound'. It has sweet taste in the mouth and appealing look. Just like Efuru, Lasinrin is easy to pound and makes high quality pounded yam. It is easy to peel, hairy and does not change colour but maintains its light yellow colour all through. It swells when pound hence takes more pounding water, smooth and it is stretchable. Both Efuru and Lasinrin have sweet taste and smooth in the mouth.

Atoja is good, stretchable, a little sweet in the mouth and less stressful to pound. It gets mouldable and stretchable easily with little pounding effort.

The non-preferred variety such as Odo is said to have 'fine' smell when cooking and appealing look but not good for pounding. This is because it gets sticky at the onset of pounding making it to be lumpy while sticking to the pestle. No matter how hard it is tried, it will always be lumpy and too soft. Okun as well is not for pounded yam just like Odo. It is not stretchable, neither sweet in taste nor bitter. It is neither white nor dark in colour. When used for pounded yam, 'its product does not stay more than four hours before it begins to spoil', says one of the processors.

Ewura is also not good for pounded yam however, cocoyam can be pounded with it to give the desired textural characteristics of a quality pounded yam. Pounded yam from Ewura as said by one of the processors is 'its appearance does not look like that of pounded yam' and its hand feel is not that of pounded yam – 'a manage su jo ni' i.e. trying to make it mouldable but still not mouldable. It tastes bland and breaks out easily. If infested by insects, it will not get cooked.

Gbongi-kamilu is not good for pounding, it changes colour right from the peeling stage. Not mouldable or stretchy. It does not have good mouth feel and taste a bit bitter. 'It is better not bought for pounding purpose' says two of the processors. To achieve an improved quality of pounded yam as explained by one of the processors, when the boiled yam is in the mortal, allow it to cool a little and pound, then leave it a little and pound again till it gives a bit of the desired pounded yam texture - mouldability. Except when harvested late with less water content.

3.4 Global process yield

The process yield depends on the variety of yam and the season. Storage can also affect pounded yam's quality as pounded yam made from stored tubers is usually better. Some yam varieties while pounding increases in volume and takes in more water thereby increasing the number of servings hence aiding the economic value/ increasing sales/profit for the processor. When yam is boiled and not properly covered, such yam will not get cooked and when boiled yam gets cold before pounding, will give bad quality. No salt must be added to the yam when boiling so as not to affect the quality of the pounded yam. Pounded yam will not be able to sell when it has bad quality such as lumpy, not stretchable – not elastic, not mouldable, dark colour and the water content. When too much water is added during pounding, it can also give too soft pounded yam. Texture is the quality characteristic used to determine when the final processing step is finished – slightly stretchable, smooth, mouldable. Gbongi is one of the yam varieties that swells during pounding and takes in more pounding water hence bringing more sales/profit to the processor. It is said to have the highest output in terms of quantity and very profitable when sold.

Based on this study, the global yield using the weight of end product from the raw material (i.e. Yield = [Weight end product/ weight raw mat]*100 is presented in Fig. 8 below. The yam variety that produced the highest weight of pounded yam in this study was Ewura followed by Atoja and then jibo. However, Awana had the least weight of pounded yam followed by lasinrin. This could be due to the fact that the weight of the raw material used for the activity varied across varieties and location of the processors.







Figure 8: Total yield per yam variety

4 DISCUSSION AND CONCLUSION

Selecting a good yam variety for pounded yam for most processors under this study was more or visual recognition of the yam varieties based on their agronomical and postharvest characteristics. To some of the processors, when the water content of the yam tuber is very high, it enhances ease of peeling however, the indication or implication means that such yam will not be good for pounding.

The adopted processing method across processors and communities were the same unlike the process used by a processor at lle-ogbo community, though unavailable for the activity. This processor does not peel the yam tubers before boiling. Once the yam is cooked and ready for pounding, the peel is removed if soft enough with hand or knife and the cooked yam directly placed into the mortal before pounding commenced. During pounding, little or no water is added as well. Some processors use the cooking water to pound while most others simply use cold water. The use of cold water to pound the yam is believe to make the pounded yam keep longer before it begins to ferment or get spoilt considering the fact that customers do not arrive at the same time to buy pounded yam.

Most processors do not like the yam in mortal to become sticky or gummy from the onset of pounding as this makes it lumpy. This is part of the reason why some yam varieties are said not to be good for pounding but best as boiled yam. When the temperature of the yam drops rapidly while pounding, it can affect the outcome or the quality of the pounded yam.

The processing steps that may easily alter the quality or make a poor quality of the final product, pounded yam if conducted badly as mentioned by the processors include peeling and cooking if improperly done. Too much water while cooking, too long cooking time and the way it is pound are also important in effecting the quality of final pounded yam hence requiring more attention. Time in which water is added during pounding is also key to obtaining quality pounded yam. If water is added to the pounding mash before it forms a glutinous dough, it produces a poor quality pounded yam. The processing steps that may easily alter the quality or make a poor quality of the final product, pounded yam if conducted badly as mentioned by the processors include peeling and cooking (too much water while cooking and over cooking) and the pounding process.

Maturity, time of harvest, length of storage and morphology as well as the variety of a yam tuber contributes also to the quality of pounded yam that will be produced. However, when yam is stored for too long, it becomes waxy and not suitable for the producing a good quality pounded yam. It becomes difficult to peel, takes more water and longer time to soften when cooking. When pounding such, it jumps around in the mortal and stressful to pound. The pounded yam produced from such is not mouldable, not stretchable, and usually not smooth but fibrous, marshy with unappealing look.





5 APPENDICES

5.1 Annex 1 Summary Table of Quantitative Data

				Processing quantitative data									
	Raw material characteristics		Peeling unit operation		Cutting unit operation		Cooking unit operation*			End- produc ts	Global yield	process	
Varieties	Av. Weight before peeling (kg)	Length (cm)	Dry matter (%)	Av Yield (%)	Productivity (Av. Peeling yield) (kg/h/op)	Piece size (w)	Productivity (Av. Wt after peeling) (kg/h/op)	Ratio [Qw/Qy]	Av. Cooking time (min)	Yield (%)	Dry matter (%)	Yield (w.b)	Yield (d.b)
Gbongi	0.88			13.04	13.04 33.93				0:28:05	81.00		106.02	
Gbongi- kamilu	0.89			41.67	33.75				0:22:18	77.75		115.58	
Lasinrin	1.73			15.38	8.67				0:26:00	166.00		91.05	
Okun	0.86			22.22	25.31				0:27:08	81.00		104.88	
Odo	0.73			30.00	12.41				0:30:04	72.00		98.65	
Awana	0.57			12.28	20.12				0:26:48	59.00		90.48	
Efuru	1.28			14.29	18.67				0:24:51	119.33		94.12	
Ewura	1.20			27.78	41.54				0:26:35	93.33		153.85	
Jibo	0.94			9.64	24.29				0:32:13	80.00		120.51	
Atoja	0.70			21.43	0.00				0:24:49	50.00		134.62	
Mean Value	0.98			20.77	21.87				0:26:53	87.94		110.98	

a,b,c,d indicates membership in significantly different value groups with a P value < 0.05



5.2 Annex 2 Overview of Quality Traits of Raw Yam, Yam during Processing and Boiled Yam

	Raw product		Cooked product								
Name of varieties	Agronomical	Technological characteristics at each step of the process			Sensory characteristics						
	characteristics	Peeling	Shaping/ washing	Example	When you look at	Texture when you touch	When you smell	Taste (In mouth)	Texture when you chew	After- taste	
Gbongi, Odo, Efuru, Jibo, Gbongi- kamilu, Lasinrin, Ewura, Awana, Atoja Okun	Gbongi-Smooth skin/peel, low water content Lasinrin- Light colour peel, hairy, light yellow flesh Ewura- Hairy, dark colour peel, high water content, big head Awana, Efuru - White flesh, hairy, straight shape, smooth skin, low water content Okun, odo- smooth skin/peel	Ease of peeling based on yam water content Gbongi-kamilu: colour change when peeling	Straight shape, long, not too big Gbongi- kamilu-big tubers with colour change while washing		Gbongi. Efuru- Appealing white coloured Lasinrin-light yellow, appealing Water yam/Ewura- not appealing, dark Okun- not appealing as it is neither white nor dark in colour Odo- gets darker if stays longer	Gbongi, Awana, Efuru, Lasinrin- Soft, stretchable, mouldable, smooth Odo-too stretchy/gummy, lumpy Gbongi-kamilu, Ewura – not mouldable, hard, lumpy, sticky	Sweet smell Odo- smells fine and appealing	Jibo- sweet like sugar Efuru, Atoja, Gbongi, Lasinrin- sweet Okun- tasteless, neither sweet nor bitter taste, Gbongi- kamilu- little bitter taste Ewura-taste bland			







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