Impact of Gender on Trait Prioritization and Food Product Profile (*Fufu*) Development in Nigeria: Guide to Breeders

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Fufu

Cassava Roots

Introduction

Nigeria ranks first in cassava production in the world with small-holder farmers contributing the highest, also sustaining food security.

Several significant cassava-based food products hold prominence in Nigeria. These include *gari*, *fufu*, and lafun. *Fufu*, is fermented wet paste food product derived from cassava roots

Objectives

- ✔ **significance of integrating gender perspectives into breeding programs**
- ✔ **examine the influence of gender roles and responsibilities on the selection of cassava varieties and trait prioritization for *fufu* production in Nigeria**

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- ✔ **identify specific cassava varietal traits that male and female farmers in Nigeria prioritize for *fufu* production**
- ✔ **investigate the primary considerations and preferences of male and female consumers in Nigeria with emphasis on colour, texture, and nutritional attributes of *fufu***

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Data sources

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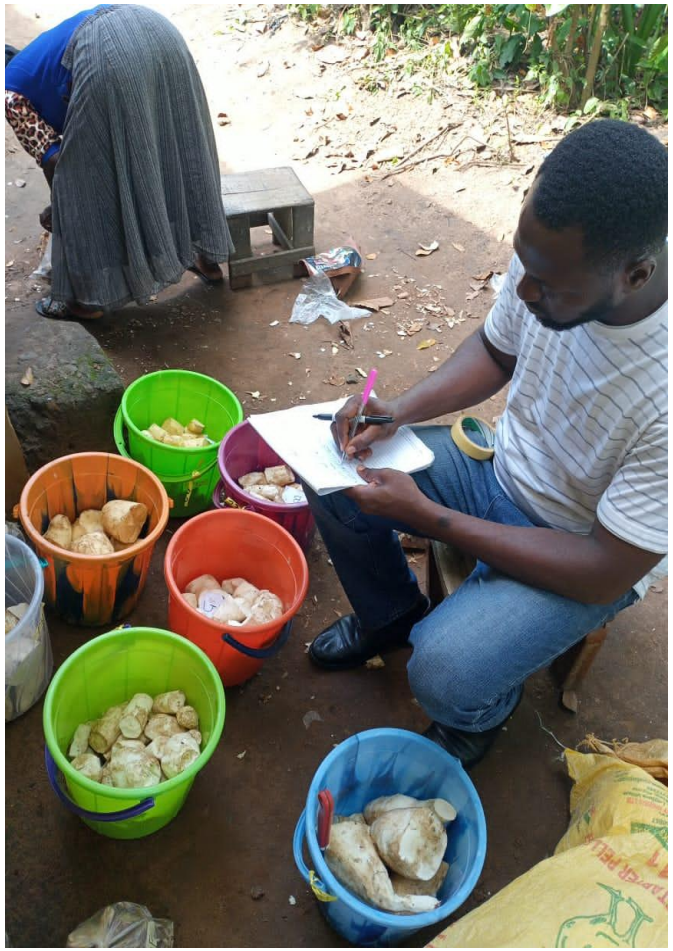
Four (04) data sets for PP

- Step 1: SoK : high and poor Qlty
- Step 2: Agronomy, processing, high and poor Qlty+ priority
- Step 3: High and poor Qlty+ Variety
- Step 4: Consumer Testing: for consolidation on sensory characteritics and priority

There (03) for Qlty characteristics

- Qualitative analysis to triangulate (by colouring)
- Selection of characteristics + prioritisation with expert group

Methodology



- **The methodology for this study involved the collaboration of four expert processors to assess 18 different cassava clones, including a local and national standard, at two locations in Nigeria (North central and South East)**
- **The assessment 18 cassava clones was conducted at various stages:**

- **raw material,**
- **processing, and**
- **intermediate/end product**

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Raw Material Assessment

The following characteristics were accessed:

- ✓**Root shape**
- ✓**Root skin colour (Outer skin)**
- ✓**Inner Root colour**
- ✓**Skin Texture, and**
- ✓**Ease of peeling**

Intermediate Product (Mash) Evaluation :

The following characteristics were evaluated:

- **Colour**
- **Texture**

End Product :

The final *fufu* products were evaluated:

- **Colour,**
- **Stretchability**
- **Smoothness**
- **Stickiness**

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The study involved 300 consumers from different zones (75 rural and urban areas respectively) to evaluate five fufu products prepared by expert processors.

- **The selection of traits was based on processors assessment.**
- **JAR (Just about Right) and**
- **CATA (Check all that Apply), were adapted.**

- **The JAR method was employed to assess traits like**

Smoothness
Colour
Stickiness and
Stretchability

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The CATA method was used to evaluate traits thus;

- **Sticky, Stretchy, Dark in color**
- **Lumps, Not easy to mold**
- **Scatters**
- **Easy to cut, Too soft, Easy to swallow**
- **Heavyweight, White, Moderately soft**
- **Low yield, High starch, Smooth**
- **Butter/Cream colour, Too hard, Draws little**
- **Yellow, Fiber particles, and Watery**

Standard Operating Procedure

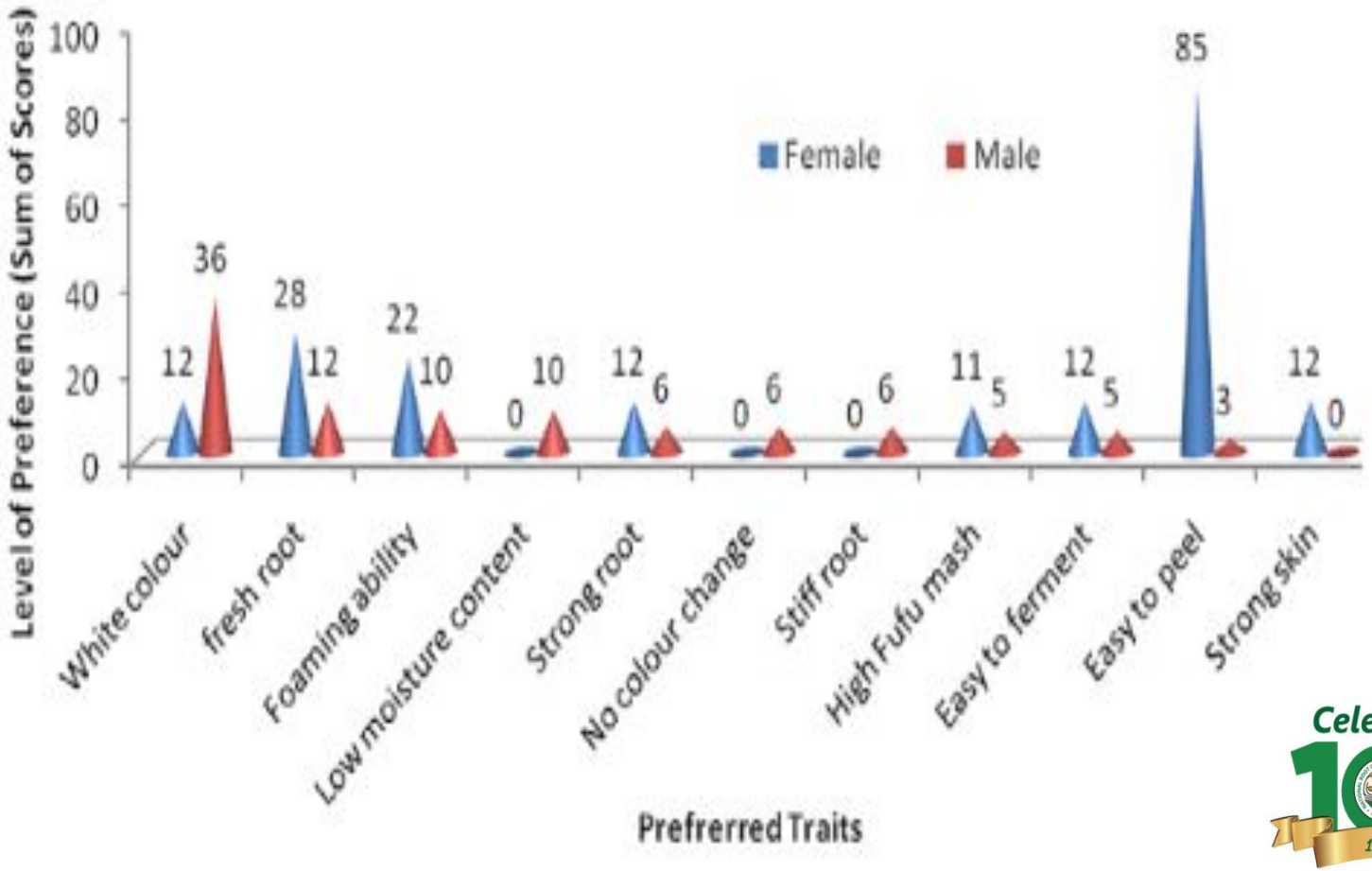
NRCRI Umudike developed the Standard Operating Procedure (SOP) for *Fufu*, a guide for breeders and sensory characterization experts

It aids in selecting cassava genotypes with desirable sensory properties and facilitates sensory profiling

The study used the SOP to assess sensory texture attributes of five cassava clones, involving 12 trained panelists.

The SOP outlines the process of *fufu* preparation

Preferred traits



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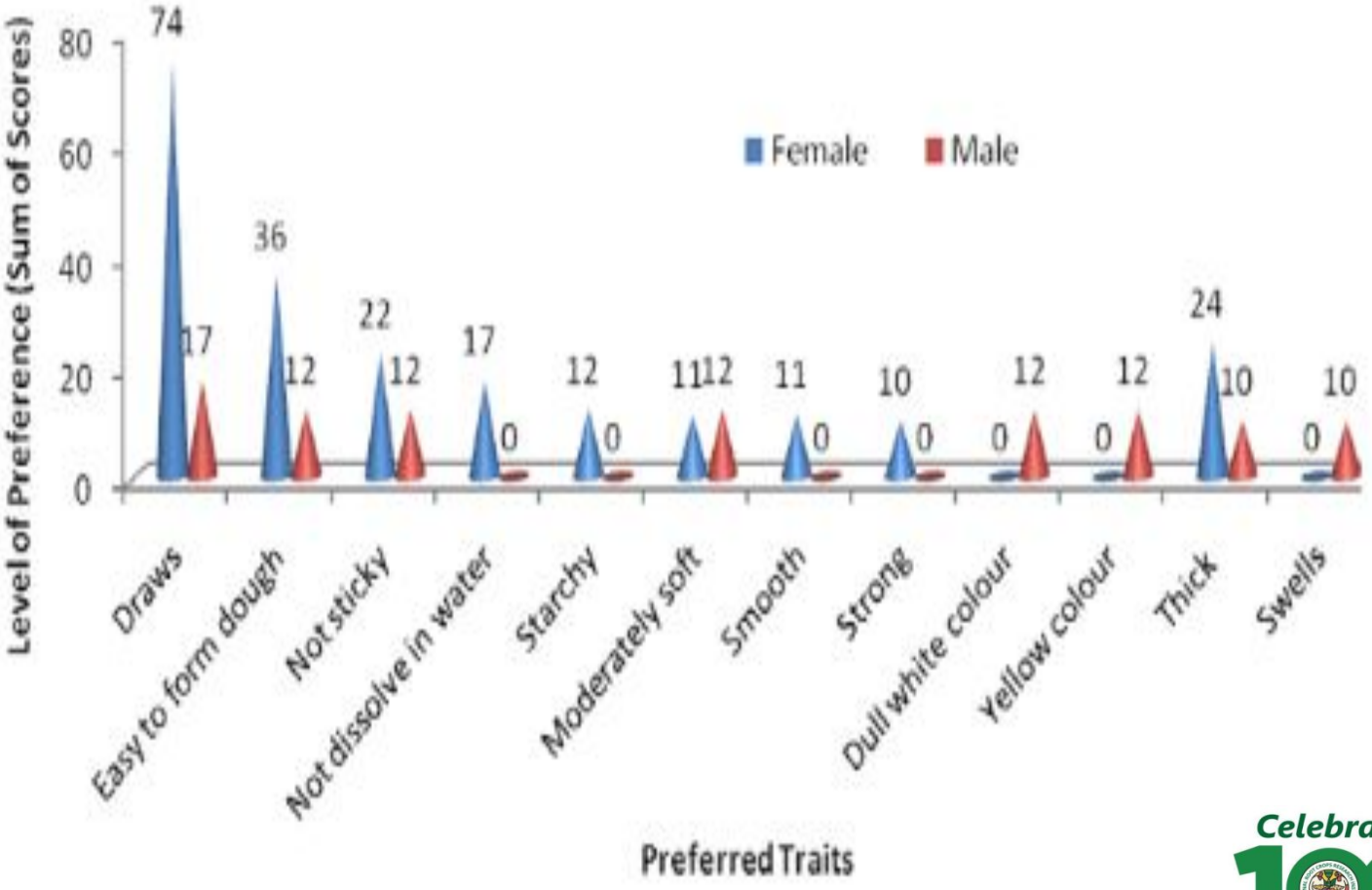
Preferred traits



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- **Quality characteristics (High and Poor)- State of Knowledge (step 1)**
- **Gendered food mapping (Step 2)**
- **Processing diagnosis (Step 3)**

Triangulation: Consideration was on quality characteristics sited more than once in Steps 1,2 and 3.

Step 2 provided information on indicators and priority level of each quality characteristics.

Step 3 provided information on Cassava varieties with high quality and poor quality fufu product.

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Triangulation of characteristics

High quality characteristics	Step 1 SoK	Step 2 Gendered food mapping	Step 3 Processing demonstrations
Raw Cassava	Moderately size root	Big sized root	Easy to peel
	Heavy roots	Fresh skin	Not foamy root
	Smooth root skin	Heavy tubers	Fresh roots(freshly harvested root)
	Dark coloured peel	Dark coloured skin/peel	Easy to ferment (Retting ability)
	White coloured root	Smooth skin	No discolouration
		Easy to peel	
		Easy to ferment (Retting ability)	

Triangulation of Characteristics

High quality characteristics	Step 1 SoK	Step 2 Gendered food mapping	Step 3 Processing demonstrations
	Gelling capacity	Ease to peel	Easy to ferment (Retting ability)
	High Starch content	Not foamy root	Neatness (mash without chaff)
Processing	Low Cyanide content	Fresh roots(freshly harvested root)	White colour fufu
	Low moisture content	Easy to ferment (Retting ability)	Easy to form dough
	No discolouration	No discolouration	Drawy (Stretchy)
		Easy to from dough	Not sticky
		High Starch content	High Starch content

Triangulation of Characteristics

High quality characteristics	Step 1 SoK	Step 2 Gendered food mapping	Step 3 Processing demonstrations
		Neatness	Smooth
		White colour fufu	Easy to Cut
Fufu Product		Easy to form dough	Mouldability
		Drawability (Stretchy)	Easy to swallow
		Not sticky	White/Milk/Yellow colour
		Heavy fufu (Weighty)	Heavy Fufu (Weight)
		Smooth	

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Select coloured terms-Use ranking from Step 2

RAW CASSAVA

	High quality characteristics based on Step 1, 2 and 3	Priority
	Fresh Skin	1
	Easy to peel	1
	Dark Coloured Skin/Peel	1
	Easy to ferment (Retting ability)	1
	White colour Root (No discolouration)	1
	Smooth root skin	1

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Select coloured terms-Use ranking from Step 2

	High quality characteristics based on Step 1, 2 and 3	Priority
	High Starchy Content	2
PROCESSING	No Discolouration (White colour)	2
	Easy to form dough	2
	Easy to ferment (Retting ability)	1

Synthesis of High Quality Characteristics: PP

Raw Cassava

Processing

Fufu Product

High quality characteristics based on Step 1, 2 and 3	Priority	CATA frequency from good varieties (Nwaocha, TMS 01/1368, TMS 01/1412) (Step 4)	Good Varieties
Big sized/ medium roots			TME 419, TMS98/0505, Imo Best, Nwaocha,Dabere, Nwanyi Umuahia
Strong roots			
Low moisture content			
Easy to peel			TME 419, TMS98/0505, Imo Best, Nwaocha,Dabere, Nwanyi Umuahia
White colour			
Fresh roots			
Smooth	240-253 (n-300)		Nwaocha, TMS 01/1368
Mouldability	185-264 (n-300)		Nwaocha, TMS 01/1368
Colour	179-233 (n-300)		Nwaocha, TMS 01/1412

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Key Results/Findings

- **The research revealed variations in trait prioritization between men and women in terms of preferences for different cassava traits in Nigeria**

- **The result shows that women tend to prioritize quality traits, while men emphasize productivity-related traits**

The study reveals that the primary factors influencing Nigerian *fufu* consumption include:

- **Smoothness; easy to swallow; odour; and Stickiness, which can either positively or negatively affect the texture, and appearance of the *fufu***

- **Female respondents' preference for certain traits is linked to**

processing parameters and

end product quality

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- **While male respondents' choices are influenced by economic factors**
- **Root qualities like size, heaviness, outer skin appearance, and flesh colour affect peeling ease, colour, yield, and overall acceptance of cooked *fufu*.**
- **Female respondents prioritized ease of peel, fresh roots, and root foaming traits(ability to ret fast and well), while male focus on white colour and fresh roots**

- **This suggests women play a central role in processing *fufu* mash, influencing specific stages like peeling and fermentation. Their indigenous knowledge and experience helps to understand these traits' impact on the final product**
- **Female respondents indicated that the use of cassava varieties that are 'easy to peel' and easy to sieve enhances labour efficiency and drudgery.**

Conclusion

- **The sensory analysis of improved cassava clones revealed that smoothness and mouldability' were the most important traits,followed by stickiness,"stretchability,' and 'colour'**

- **The study also found that appearance, texture, and aroma were the primary factors influencing gender-specific consumer preferences for *fufu***

- **The study suggests that these traits should be central to crop improvement efforts for cassava varieties**
- **There is need therefore for sustained multidisciplinary and collaborative approach involving various stakeholders in crop improvement programs, especially those related to the science of food processing**

- **This approach would facilitate the breeding of cassava varieties that align with end-user preferences and enhance the adoption of these new varieties**

Thank You for Listening