Gender & Breeding Initiative

CGIAR

Product Profiling and Gender in Cassava Breeding: The Baseline

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Outline

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- Results:
  - Nigeria
    - Gender based constraints and opportunities in Nigerian cassava production
    - Gendered cassava trait preferences
    - The “swellability” of *gari*
  - Uganda
    - Flour power: *Kwin* in Uganda
    - The Genetics of ”Softness”
- Summary/Next Steps

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IITA Research to Nourish Africa

NRCRI UMUDIKE

NaCRRI

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Why Gender Responsive Cassava Breeding?

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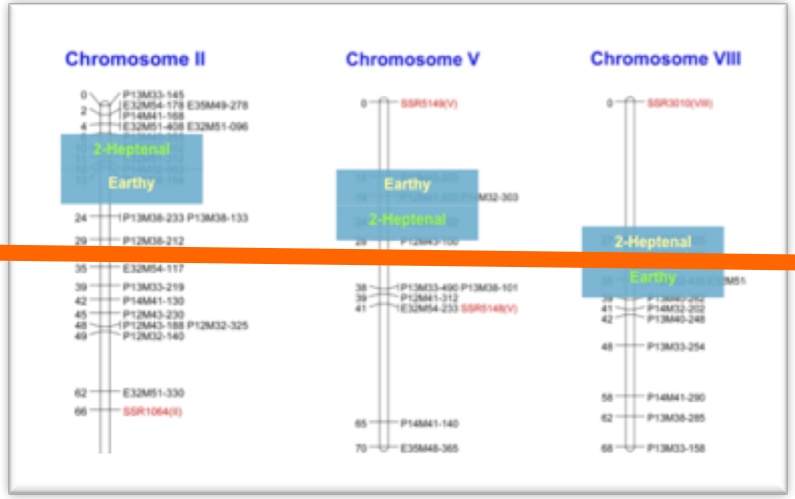
- Provide information that will enable development of varieties that meet producer, processor and consumer demands- increased adoption and impact
- Think like a company? Understand demand and consumer profiles- develop typologies
- Diversity of end users and equitably addressing their needs
- Better define traits and relative importance for users by “ground-truthing” preferred characteristics and refine phenotyping methods for breeding

Background

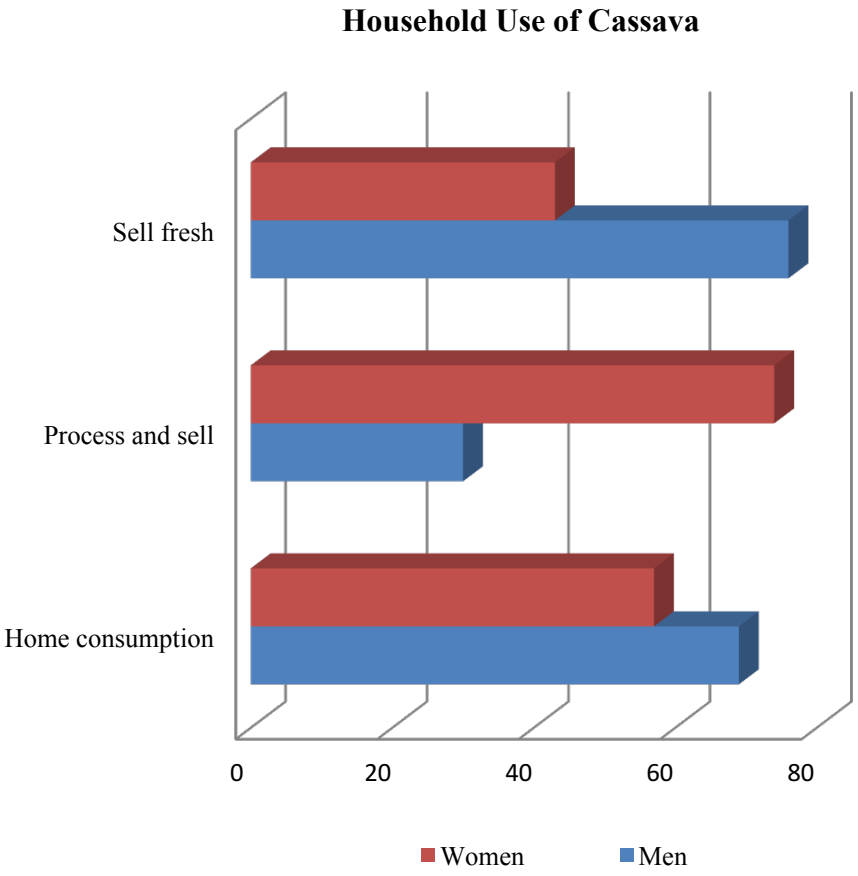
NextGen Cassava: Accelerating the rate of genetic gain in cassava breeding

www.nextgencassava.org

Can NextGen Cassava become demand-led?



Cassava production in Nigeria presents different gender based constraints and opportunities



- Women had less access to improved varieties from extension services or research stations, but still tried new varieties when possible
- *"Though our farm may not be as large as their own, though we do not inherit land and go to training meeting regularly, we do try out new things on our farms"*

- General constraints to cassava production were similar between men and women. Women particularly mentioned weeding and poor fertility of land as issues, while men mentioned lack of mechanized farm equipment and inputs

Olaosebikan *et al.*, submitted

Ranking by men and women very similar for different cassava traits…

Cassava variety traits	Percentage	Rank men farmers	Percentage	Rank women farmers
High yield	17.1	1	19.6	1
Poundability	13.4	2	7.3	5
Dry matter content	12.6	3	12.8	3
Taste	9.3	4	6.9	6
Fast/early maturing	7.6	5	10.5	4
Root size	7.1	6	15.3	2
Other agronomic characteristic	7.0	7	6.9	6
Other cooking /processing quality	6.0	8	3.0	10
Post-harvest shelf life	5.2	9	3.0	10
Fast cooking/mealiness	4.4	10	3.7	9
Flesh/root color	4.1	11	6.1	8
Good price/marketability	2.2	12	2.2	12
Resistance to pest and diseases	1.9	13	2.2	12
Labor requirement	1.1	14	0.2	15
Adaptation to extreme weather condition	0.8	15	0.5	14

Olaosebikan *et al.*, submitted

… and for varieties …

	Ranking	1st	2nd	3rd
Location				
Pontela-Akinola	*Men*	Molekanga	Oko iyawo	Arubielu/Egedudu
	Women	Molekanga	Odongbo	Oko iyawo
Elere-Adeogun	*Men*	Dangaria	IITA	419
	Women	Dangaria	IITA	Odongbo
Agodo	*Men*	Oko iyawo	Ege dudu	Adelowo
	Women	Idileruwa	Adelowo	Ege dudu
Agbetu	*Men*	Texaco	Onigidudu	Olusumeje
	Women	Lufodo	Idileruwa	Texaco
Oba Oke	*Men*	Arubielu	Oko iyawo	Ege funfun
	Women	Oko iyawo	Arubielu	Tomunde
Iborro	*Men*	Idileruwa	Odongbo funfun	Dajofolowo
	Women	Idileruwa	Oko iyawo	Aporo-ofo
Umuoso	*Men*	Nwaocha	NR	Katikati
	Women	Nwaocha	NR	Katikati
Imerienwe	*Men*	Nwankwo	Chigazu	Nwaonuhie
	Women	Nwageri	Chigazu	Nwankwo

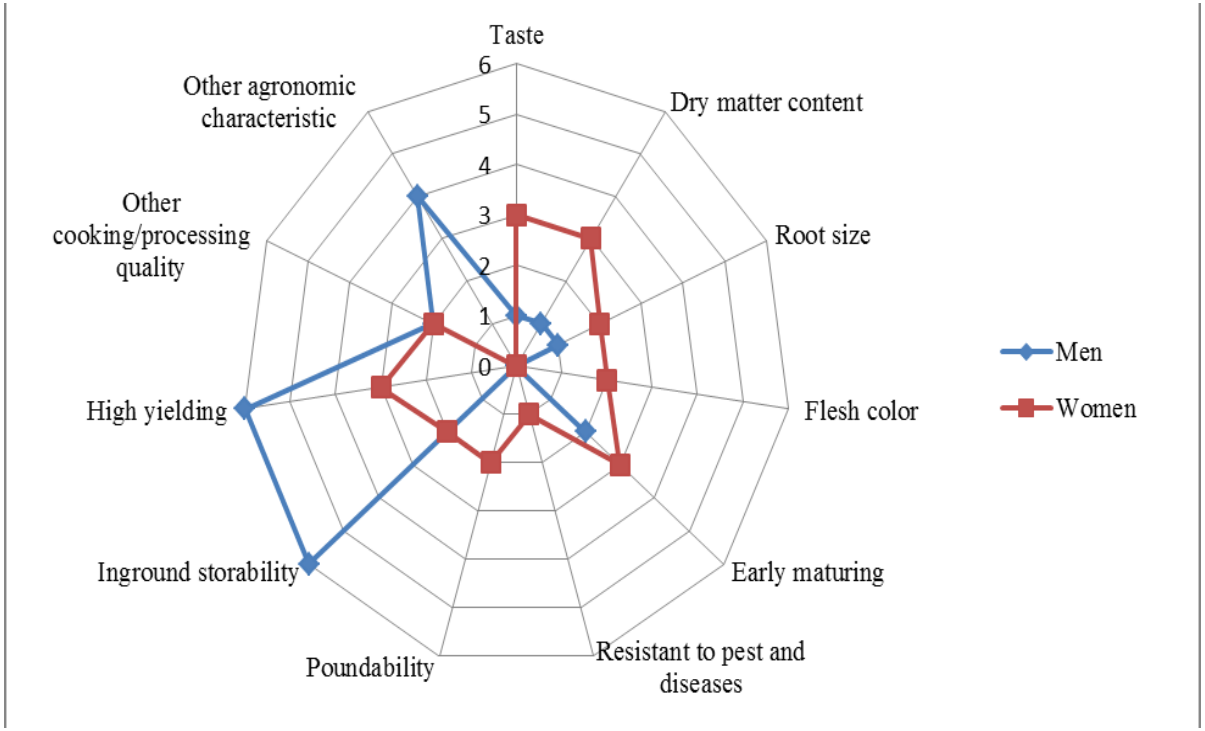
Olaosebikan *et al*., submitted

…yet reasons for ranking differ!

Name of variety (type)	Reasons for preference Men	Reasons for preference Women
Molekanga (local)	high yielding, poundable, good for gari, marketable, early maturing (6-9 months). Also called poverty removal crop	poundable, root size, high yielding, weed suppression, low cost of production and early maturing. Also called food security friendly cassava variety
Oko Iyawo (local)	poundable, mealy, high yielding, early maturing (7-12 months) and resistant to pest and diseases	mealy, short time to cook, good taste and product quality for gari, eba, fufu and lafun
Dangaria (Improved)	good taste, white color, very tall with multiple stems for planting materials. Good for feeding livestock	high market demand, poundable, good root and product color, weed suppression, tall stems, good product quality for gari, fufu, and lafun
Idileruwa (local)	resistant to pests and diseases, In-ground storability without rotting, weed suppression, low cost of production	can survive after pest attack, underground storability without rotting, can stay for 3-4 days after harvesting, good product quality
Nwaocha (local)	dewaters faster, high dry matter, late maturing, allows for intercropping	beautiful to behold, good plant architecture, ferments quickly 2-3 days, odorless, good product quality for abacha, lafun and gari
Nwankwo (local)	high yielding, marketable and early maturing	good product quality, high root number and early maturing
IITA (Improved)	pest and disease resistance, root size and shape, branches well and smothers weeds, can survive harsh conditions	High yielding, post-harvest in-ground storability, high dry matter content makes gari swell.

Olaosebikan *et al*., submitted

Example: IITA in SW Nigeria



Men preferred IITA for its in ground storability (3 to 4 years without getting spoilt), and high yield. This was different for women, who largely focused on early maturity, taste and dry matter content.

Olaosebikan *et al*., submitted

The “Swellability” of Gari

Defining “good product quality”

- From FGDs the clearest difference in reasons for preference of varieties between men and women was “product quality”
- Women dominate cassava processing, logical that product (gari, fufu, lafun) processing is of specific importance
- Challenge is: how can we breed for “good product quality”?
- “Translate” local knowledge and units of description into standardized measurable trait variables for breeder on station selection

Can we breed for swelling capacity of Gari?

In baseline FGDs women farmers indicated that *gari* quality is an important criteria in selecting varieties for production, and mentioned "swelling" was key

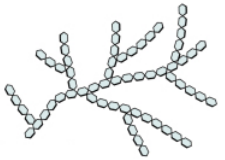
Follow on KII with processors (mostly women) uncovered 3 types of swelling:

1. Swelling of the *gari* when hot water is added and the *eba* paste is prepared
2. Swelling in the stomach: how heavy the *eba* feels in the stomach or how many time it takes before one gets hungry again
3. (Swelling) of the *gari* when being roasted (gari yield): The extent the *gari* does not shrink or even increases when the moisture is driven out during the roasting

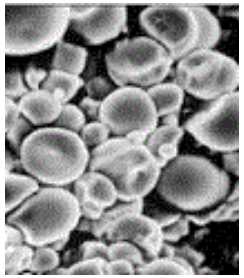
What is swelling? Can we breed for it?

- Higher starch content of the root results into higher swelling capacity (measure=starch content)
- The content of long chained (vs short chained) amylopectin may result in higher swelling (measure=amylose amylopectin ratio)
- Starch granule size is larger-swelling power decreases when temperature increases. At higher temperatures larger granules are associated with increased swelling (measure=starch granule size)

Amylose



Amylopectin



Cassava starch granules

Increasing complexity: GXEXC

1. Gari is not fresh starch but also includes fiber and pectin cell walls
2. Gari undergoes a fermentation products of different lengths dependent on the preferences of the users
3. Gari is processed very differently across sites
4. Growth environment impacts starch quality/quantity?

How do these impact gari quality, especially “swellability”?

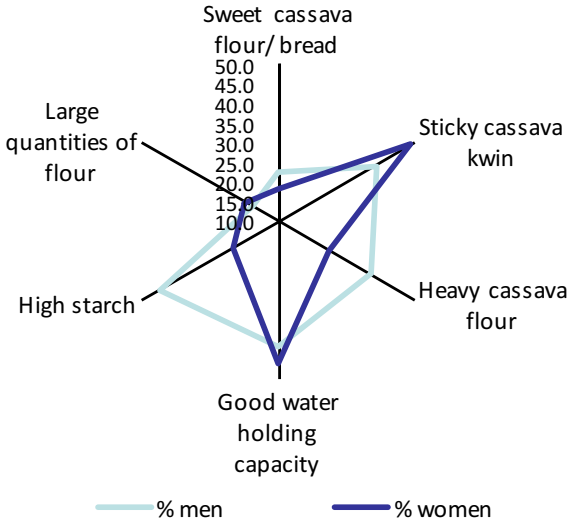
Do these compounding factors negate or amplify the varietal differences for gari quality? Can we breed for gari quality?

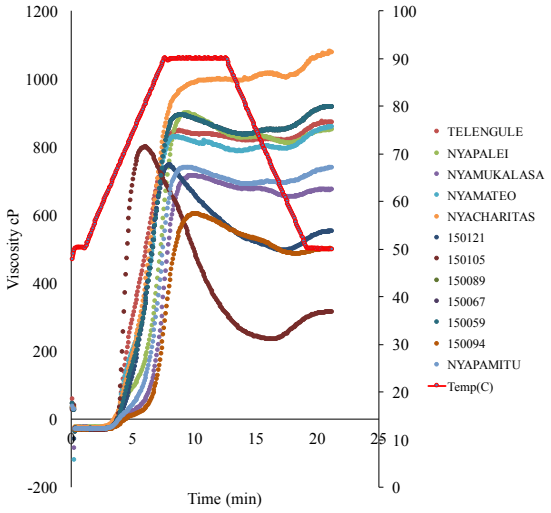
Not yet! New research needed to:

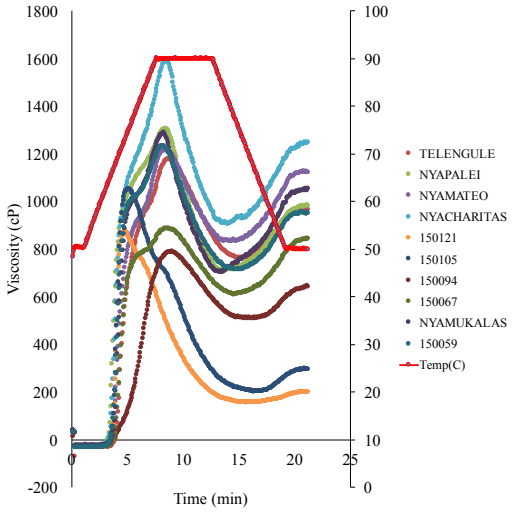
Need to define gari and user typologies, triangulate baseline data with participatory trials, processing and sensory evaluation

Flour Power: *Kwin* in Uganda

- Bitter cassava varieties still cultivated- flour making
- Zombo (NW) trait preferences of men and women + flour pasting properties of 12 genotypes based on the key trait preference by RVA profiling
- Two traits emerge for study: Sticky *kwin* and good water holding capacity

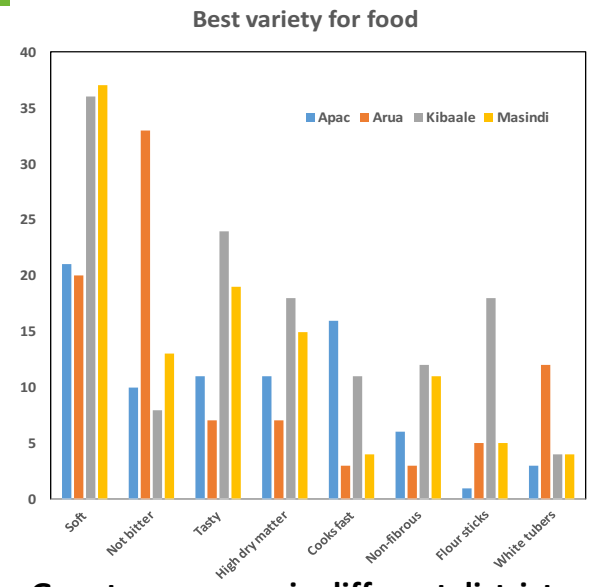




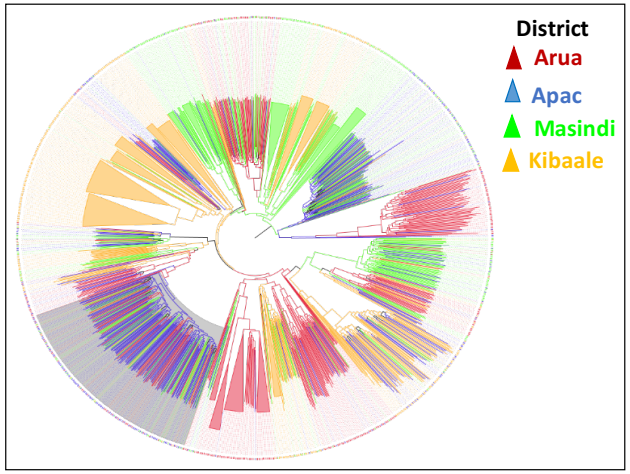


Genetics of Softness

Research Program on Roots, Tubers and Bananas



Genotypes grown in different districts



- "You can determine a nice cassava for eating when it gets ready after cooking, if it is soft and is not hard."
- Unique genotypes amongst districts can explain some of observed difference in trait preferences across districts
- The variety name given by farmers in most cases do not depict unique accessions e.g. Bao
- Phenoyping tools under development (measuring softness)

Genotypes: 350 NaCRRI breeding lines and 80 farmers' accessions → Planted at 2 locations (Lira and Kamuli) in Uganda → Phenotyping using scoring scales developed above → Genome-wide association study (GWAS)

Summary

- Transcription of “preferences” is problematic- cassava producers have a tacit feel about what works for them, and choose ”trait packages”
- Understanding- quality traits like *good for gari* are still opaque- need considerable work to unpack these descriptions into “breedable” units
- What are ”gendered traits”? Binary comparison of men vs women.
- New lines of enquiry to examine choice experimentation with traits (economic weights), participatory selection to triangulate trait packages, adoption study to track uptake of breeding lines, comparative study to examine impact of gender blind study design

Formulate breeding strategies in relation to the present and anticipated social dynamics in cassava cultivation and processing

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THANK YOU!