

Product Profile name: High root yielding cassava varieties with high dry matter and carotene contents for Nigeria



Bunmi Olasanmi

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Design target

High yielding and moderately branching cassava varieties with high dry matter and carotene content

Dr Bunmi is a Lecturer, Department of Agronomy, Faculty of Agriculture, University of Ibadan, Nigeria. His responsibilities include lecturing, supervision, research, agronomy and postharvest utilization of crops, administrative roles and community service. Olasanmi bagged his B.Sc. in Agriculture (1995 to 2001), M.Sc. in Agronomy (2003 to 2004) and PhD in Plant Breeding (2010) from University of Ibadan. During his PhD programme (funded by Kirkhouse Trust Foundation, UK), he won the Institute for Genomic Diversity (IGD) Fellowship for African Scientist to undergo training at Cornell University in 2007. He worked as a Consultant with Harvest-Plus and Bio-Cassava Plus at National Root Crops Research Institute, Umudike for 3 years before joining University of Agriculture, Makurdi, Nigeria where he worked for seven months. He later joined University of Ibadan in 2013. He is an alumnus of the African Plant Breeding Academy (Class I) since 2013 and the African Biosciences Challenge Fund (ABCF) since 2017. Olasanmi has released more than 10 cassava varieties. He also serves as Departmental Postgraduate Coordinator. He is a member of International Society for Tropical Root Crops – (Africa & globally), Generation Cassava Partnership; Nigerian Plant Breeder Association and African Plant Breeders' Association. He has attended international conferences, seminars and trainings. He has supervised many students at B.Sc. M.Sc. and Ph.D. levels and has published his research findings in local and international Journals.



University of Ibadan



Product Profile design team

Step 1

PP Design Team Lead/Champion		
		Bunmi Olasanmi
		University of Ibadan, Nigeria
PP Design Team		
Person	Area of Expertise	Name of organization
Bunmi Olasanmi	Plant Breeder/Agronomist	University of Ibadan, Nigeria
Ogheneruemu Obi-Egbedi	Agricultural Economist	University of Ibadan
Ibukunolu Oluwadamilola Udemba	Post-harvest and crop utilisation expert	University of Ibadan
Toyin Osho	Breeder/Agronomist	University of Ibadan
Elijah Ndikom	Breeder, market research expert	University of Ibadan
Codjia Esperance Deo Gracias	Breeder	Pan African University of Life and Earth Sciences Institute (PAULESI)/IITA, Ibadan Headquarters
Adenike Damilola Ige	Breeder	International Institute of Tropical Agriculture, Ibadan, Nigeria
Mr. Peter Babatunde	Farmer representative	Ijebu Development on Poverty Reduction (IDIPR), Awujale Palace Ijebu-Ode, Ogun State, Nigeria
Clients and markets		

Step 2

Product profile descriptors	
Product profile name	Cassava with high yield, high dry matter and total carotenoid contents
Crop	Cassava (<i>Manihot esculenta</i> Crantz)
Country	Nigeria
Geographic regions	South, North Central and North-east
Market segment and positioning	Cassava consumers, industries (<i>Fufu</i> , flour and <i>Gari</i>) and exports
Name of target variety to be replaced	IITA-TMS070593 Strength: High fresh root yield and dry matter content with moderate carotene content Weaknesses: Carotene content lower than target; highly branching
Date PP created	01 July 2022

Target client and use	
Value chain primary clients/customers	Cassava farmers (cultivation), processors (for yellow <i>Gari</i> and <i>Fufu</i> , highly cherished by millions of Nigerian), end-users (consumption of cassava products with high vitamin A precursor)
Market scale	Households, local, regional, national and international markets
Use	Food
Type of processing	Peeling, grating, soaking, fermentation, pressing, drying, toasting, cooking, boiling and pounding
Market class	Bio-fortified yellow <i>gari</i> , flour and <i>fufu</i>

Target crop producers and production system	
Number of farmers	1.8 million
% ratio: male to female farmers	55-65 (male) : 35-45 (female)
Production system	Open field with no irrigation

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Area of production	2 million hectares
Growth habit	Shrub (erect and intermediate)
Expected level of inputs	Low fertilizer and protection chemicals
Typical yield range of target system	10-20 t/ha
Cropping system	Mono-crop and inter-crop
Mechanization	Mostly manual
Agroecological zone(s)	Rainforest, derived savannah and guinea savannah
Total vegetative propagation material market	50 bundles (A bundle = 50 stems ; 1 stem (1m) = 4 cuttings)

Variety technical specification

Step 3

Client/customer	Driver	Trait category	Preference group: Women (W) Men (M) Youth (Y) W+M+Y (All)	Trait demand classification: 1. Essential/ "must have" 2. Niche opportunity 3. Added-value 4. Winning trait	Target traits	Trait description (Quantitative measures)	Name of benchmark variety	Performance required compared to benchmark variety <, =, > etc.	
Farmer	Productivity	Yield	All	1	Storage root yield	Frest root yield estimated at 12 months after planting (target is 40 t/ha)	IITA-TMS-IBA070593	>	
		Total carotenoid content	All	4	Total carotenoid content	Carotenoid content measured at 12 months after planting (Target: At least 20 µg/g carotene) content	IITA-TMS-IBA070593	>	
		Biotic stress resistance	All	1	Resistance to cassava mosaic disease (CMD)	Incidence of 0 and severity of 1 (1-5 scale)	IITA-TMS-IBA070593	=	
		Abiotic stress tolerance	All	3	Stay green during dry period	Colour of all its leaves that remain green during dry period (3-4 months)	IITA-TMS-IBA070593	>	
	Fodder/Forage	Biomass	All	3	Plant vigour	Moderately branching with medium vigour	IITA-TMS-IBA070593	<	
		Animal nutrition	All	3	Hydrocyanide (HCN) content	HCN content measured at 12 months after planting (The HCN content should be less than 50 µg/g)	IITA-TMS-IBA070593	<	
		Animal palatability	All	3	Hydrocyanide (HCN) content	HCN content measured at 12 months after planting (< 50 µg/g)	IITA-TMS-IBA070593	<	
		Animal digestibility	All	3	High digestibility	Low fibre content (<1%) of roots 12 months after planting	IITA-TMS-IBA070593	<	
	Crop management and harvesting	Plant architecture	All	1	Branching	Height at first branching and degree of branching	IITA-TMS-IBA070593	<	
	Market value and price	Root dry yield	All	1	Dry matter content	% of dry matter measured 12 months after planting (> 20% dry matter content)	IITA-TMS-IBA070593	>	
		Crop duration	All	3	Early bulking	Root yield of >35 t/ha at 12 months after planting	IITA-TMS-IBA070593	>	
	Post-harvest storage	Storage life	All	3	Post-harvest physiological deterioration	Level of deterioration at about 7 days after harvesting	IITA-TMS-IBA070593	<	
	Transporter	Durability and cost	Transportability and storage	All	3	Root shape and stability	Conical-cylindrical root shape (maximises arrangement in transporting vehicles) and	IITA-TMS-IBA070593	>

						stability against deterioration		
Processor	Raw material quality specification	Milling	All	3	Mealiness	Very mealy when boiled (score of 3 on a scale of 1-3)	IITA-TMS-IBA070593	>
Retailer	Sales and profit	Shelf-life	All	3	Storability of products	Storage of <i>Gari</i> and <i>Fufu</i> flour and other cassava flours for about 12 months	IITA-TMS-IBA070593	=
Consumer	Satisfaction	Taste	All	3	Taste of products	Taste of <i>Gari</i> (sour), <i>Fufu</i> (slightly sour) and flour (sweet)	IITA-TMS-IBA070593	>
		Appearance	All	3	Products visual appearance	Root flesh showing Yellow colour	IITA-TMS-IBA070593	>
		Shelf-life	All	3	Storability of products	Storage of <i>Gari</i> , <i>Fufu</i> and flour for about 12 months	IITA-TMS-IBA070593	=
		Nutrition	W	3	Total carotenoid content	Total carotenoid content of 20 µg/g or more measured 12 months after planting	IITA-TMS-IBA070593	>
		Digestibility	All	3	Fibre content	Low fibre content of roots (<1%) at maturity (12 months after planting)	IITA-TMS-IBA070593	<
		Food preparation	W	3	Ease of preparation	Moderate poundability to make <i>Fufu</i> after boiling (mealy)	IITA-TMS-IBA070593	>
Seed/Vegetative material producer	Scalability and cost	Seed numbers	All	3	Plantable stem yield	Number (10-20) of cuttings per plant 12 months after planting	IITA-TMS-IBA070593	=
		Reproductive fertility	All	3	Seed production rate and seed viability	Number of seeds produced per plant 12 months after planting (Target: 200 seeds per plant)	IITA-TMS-IBA070593	>
		Ease of vegetative propagation	All	3	Rate of sprouting	Number of sprouted cuttings per plot	IITA-TMS-IBA070593	>
Seed distributors	Variety identification	Unique appearance	ALL	3	Plant and stem appearance	Distinctiveness of variety for easy identification	IITA-TMS-IBA070593	=



Storage roots of yellow University of Ibadan Cassava (UIC) genotype at harvesting



Cassava yellow roots processed into *Gari*



Processed Cassava roots into *Gari* with different levels of beta carotene content. The more yellow the *Gari*, the higher the content of beta carotene

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