



**HarvestPlus**  
Better Crops • Better Nutrition

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# Crop Product Profile

**Vitamin A Casava  
Nigeria**



## 01. Executive Summary

Nigeria is the world's largest producer of cassava, producing about 54 million tons a year. 90% of it is used for make food products such as gari, alibo, eba, lafun-amala and abacha. The average consumption of cassava in Nigeria is 700 g/person/day.

ProVitamin A Cassava is well adapted to the different Nigerian soil types and climatic conditions. These biofortified cassava varieties are characterized for their yield,  $\beta$ -carotene content, cooking characteristics and disease resistance.

Mainstreaming biofortification in cassava has been a successful strategy focused on reducing the menace of micronutrient deficiency among the most vulnerable groups of people (pregnant women and children under the age of 5) in Africa.

HarvestPlus – in partnership with others institutions and governmental entities - has helped Nigerian communities to adopt the use of a decentralized stem multiplier mechanism through activities such as food fairs, Farmers Field Day (FFD), commercialization, in order to scale-up dissemination and promoting utilization.

Since 2015, almost half a million households are reached with biofortified cassava planting stems across Nigeria every year.

## 02. Popular varieties in Nigeria

| Line                            | Vit A content (ppm) | Developed by   | Year of release | Main characteristics   | Yield (ton/ha) |
|---------------------------------|---------------------|----------------|-----------------|--|----------------|
| IITA-TMS-IBA011368, Umucass 36  | TCC: 7              | IITA and NRCRI | 2011            | Moderate CMD resistance, high yielding (>25t/ha), dual-purpose, higher carotene, Dry matter: 33.4%                               | 26,7           |
| IITA-TMS-IBA011412, Umucass 37* | TCC: 7              | IITA and NRCRI | 2011            | Moderate CMD resistance, high yielding (>25t/ha), early bulking, stay green, dual-purpose and drought, Dry matter 30.1%          | 29,8           |
| IITA-TMS-IBA011371, Umucass 38  | TCC: 8              | IITA and NRCRI | 2011            | Moderate CMD resistance, high yielding (>25t/ha), early bulking, stay green, dual-purpose and drought tolerance, Dry matter 30.7 | 20,1           |
| NR07-0220, Umucass 44           | TCC: 12             | IITA and NRCRI | 2014            | Moderate CMD resistance, high yielding (>25t/ha), early bulking, stay green, dual-purpose and drought tolerance, Dry matter 32   | 25             |
| IITA-TMS-IBA070593, Umucass 45  | TCC: 12             | IITA and NRCRI | 2014            | Moderate CMD resistance, high yielding (>25t/ha), early bulking, stay green, dual-purpose and drought tolerance, Dry matter 33   | 27             |
| IITA-TMS-IBA070539, Umucass 46  | TCC: 11             | IITA and NRCRI | 2014            | Moderate CMD resistance, high yielding (>25t/ha), early bulking, stay green, dual-purpose and drought tolerance, Dry matter 30   | 25             |

Yield values correspond to the average of the sites where the line is commercialized.

\*Green materials were developed and release funded by HarvestPlus

### 03. Productive regions:

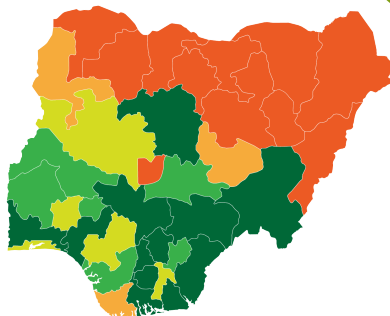


Figure 1

**Figure 1**  
Traditional cassava production across the country

| Region of the country   | Scale of production |
|---|---------------------|
| Ogun, Ondo, Kogi, Benue, Kaduna, Taraba, Cross river, Rivers, Akwa-Ibom, Imo, Anambra and Enugu                 | Very High (> 1500)  |
| Oyo, Kwara, Ekiti, Nassarawa, Delta, and Ebonyi   | High (751-1500)     |
| Osun, Lagos, Edo, Niger and Abia  | Medium (501-750)    |
| Bayelsa, Plateau and Kebbi  | Low (251 to 500)    |
| Sokoto, Zamfara, Kastina, Kano, Jigawa, Bauchi, Yobe, Borno, Gombe, Adamawa and Federal Capital Territory (FCT) | Low (251 to 500)    |

Figure 1: Proportion of cassava production in Nigeria across states and regions.  
National Food Reserve agency, Nigeria 2007



### 04. Preferred planting and harvesting seasons for the crop in the country



#### Main Planting seasons

**Planting season:**  
**November – December**

**Harvesting season:**  
**January – February**

# Top agronomic traits for biofortified cassava in Nigeria



**Early maturity**

## Relevance for adoption on farmers and producers

Reduction in the number of days to harvest will represent a greater income in a shorter period compared against other materials with late maturity. The production will have better chances to be sold with a better price. Early maturity will let varieties enter the market when prices are still high and increase crop profitability.

## Trait indicators commonly used for crop improvement:

Days to anthesis (Phenotypic)  
Days to maturity (Phenotypic)  
Heading seeding interval (Phenotypic)



**Big heavy root**

## Relevance for adoption on farmers and producers

Reduces peeling time, firm to hold, produces more mash after grating (however, as mentioned, too big and long roots might hamper peeling as they cannot be held comfortably in hand and have to be cut first). Farmers can process less roots for more products in a shorter time.

## Trait indicators commonly used for crop improvement:

### Size of roots (Phenotypic)

#### Ranks

**Big:** 40cm length, >25cm circumference.  
**Medium:** 40 -20cm length, 25-10cm circumference.  
**Small:** <20cm length/ >10cm circumference.

### Root yield (Phenotypic)

Rank of yield (ton/ha)  
Low: < 10  
Medium: 15 – 25  
High: 26 – 35  
Very high: > 35



**Not rotten**

## Relevance for adoption on farmers and producers

Enables piece meal harvesting and year round availability of nutritious food product for household consumption and product marketing for income generation

## Trait indicators commonly used for crop improvement:

### In-ground storability (Phenotypic)

Period after maturity (in terms of months or years) .  
Months after maturity: sample every 3, 6, 9 months after planting, and tests roots for fibrous content.



# Top agronomic traits for biofortified cassava in Nigeria



**CMD Resistance**

## Relevance for adoption on farmers and producers

CMD resistance tolerant varieties will be capable of surviving the sustained presence of the disease; this characteristic will allow an acceptable grain production under an infestation fungus.

## Trait indicators commonly used for crop

Selection pressure in segregating populations under infestation of CMD virus that causes the problem to evaluate tolerance and resistance to the disease.



**Low water content/high dry matter**

## Relevance for adoption on farmers and producers

Biofortified cassava that has low water content gives more mash, gari quantity/yield and reduces discoloration in gari at each processing stages, retains more provitamin A or total carotenoid content. There is a notorious difference in the garification (the yield of gari that can be obtained from a unit of fresh cassava roots) varieties, the ones with a higher dry matter and starch content will provide more gari and fufu from the same mass of fresh roots.

## Trait indicators commonly used for crop

**Ratio of dry matter content (Analytics)**  
Dry matter content = High < 25%

## Top post harvest and marketing traits for biofortified cassava in Nigeria



**Bright Yellow Color**

### Relevance for adoption on farmers and producers

Attractiveness gives higher price/value for the produced product (gari, eba, fufu, Abacha) making a better reward. From participatory processing demonstrations, we learnt that attractiveness is one of the most important descriptors and is evaluated by consumers according to color and granule size. A nice clean yellow- gari is obtained by the meticulous process of good peeling, good hygienic conditions and limited level of fermentation

### Trait indicators commonly used for crop

Spec. HPLC iCheck Portable photometer for rapid screening and quantification of total carotenoid content. Operates in both lab and field. (Analytics)



**No/Less fiber and lumps**

### Relevance for adoption on farmers and producers

No/less fiber and lumps yellow gari/eba/fufu will increase monetary value and sustain patronage, thereby a steady income is ensured for gari marketers, which are mostly women.

### Trait indicators commonly used for crop

Sensory-Visual and weighing of dried fiber in grams (Analytics)



### Relevance for adoption on farmers and producers

A very dry gari will preserve its quality for a longer time, especially the yellow one. This guarantees a year round availability of gari for sale at a time when profit is good. Women gari marketers may be able to control to an extent the price of gari if it is very dry. Gari can also be stored till the season when gari sells more and for a higher price such as during festive (after fasting period, gari is given as gifts to the less privileged), school resumption/holidays, and dry seasons

### Trait indicators commonly used for crop

Dryness of yellow gari is an important factor for grading from best to good gari.

## Quick Reference Guide

### Cassava products (gari/eba/tufu)

| Color  | Granule size and uniformity       | Mouth feel/dryness               | Aroma  | Moldable        | Taste                                  |
|--|-----------------------------------|----------------------------------|--|-----------------|--|
| Bright, attractive neat yellow                 | Uniform granules (fine or coarse) | Crunchy                          | Fresh, pleasant                                  | Soft, moldeable | Blank, sour or sweet                   |
| Sensory-Visual -brightness of the yellow color | Sensory-Visual and Hand-feel      | Sensory-Hand-feel and mouth-feel | Sensory- Odour- Absence of rancid or stale odour | Sensory-By hand | Sensory-Mouth feel by a trained panel. |

### Contact us:

If you have any questions or want to access to our germplasm, please contact our breeders:

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