



Global Market Intelligence Briefer

Millet | Nigeria

Generated on 16 April 2026



Market Intelligence
Area of Work

The CGIAR Market Intelligence Area of Work aims to maximize the impact and return on investment of breeding programs by integrating market insights, behavioral intelligence, and strategic prioritization. It identifies high-impact opportunities, guides product development, and enhances product adoption and lifecycle management through decision-support tools.

ENGLISH VERSION

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A. Market Segments

	Harvested area (ha)	% of Total harvested area
Total Area Covered by Seed Product Market Segment (Active only)	1,010,281	100
<u>Millet Pearl WAF MS00643</u> Millet - Pearl Non-Hybrid WAF Food; Home Consumption; Processing Greyish; Cream Sudanian Zone Rainfed Mid	507,679	50
<u>Millet Pearl WAF MS00641</u> Millet - Pearl Non-Hybrid WAF Food; Home Consumption; Processing Greyish; Cream Sahelian Zone Rainfed Early	335,068	33
<u>Millet Pearl WAF MS00646</u> Millet - Pearl Non-Hybrid WAF Food; Home Consumption; Processing Greyish; Cream Sudanian Zone; Guinea zone; Savanna Rainfed Late	152,304	15
<u>Millet Pearl WAF MS00644</u> Millet - Pearl Hybrid WAF Food; Home Consumption; Processing Greyish; Cream Sudanian Zone Rainfed Mid	10,153	1
<u>Millet Pearl WAF MS00642</u> Millet - Pearl Hybrid WAF Food; Home Consumption; Processing Greyish; Cream Sahelian Zone Rainfed Early	5,077	1
National Harvested Area (ha) (FAOSTAT)	1,010,281	
Difference between market-segmented area and national harvested area	0	0

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B. Market Segment Criteria

MS Criteria	Value	Harvested area (ha)	% of Total harvested area
Crop	Millet	1,010,281	100
Subregion	West Africa	1,010,281	100
MaterialType	Non-Hybrid	995,051	98
	Hybrid	15,230	2
Consumer Product Type	Food; Home Consumption; Processing	1,010,281	100
Color	Cream; Greyish	1,010,281	100
Production Environment	Sudanian Zone	517,832	51
	Sahelian Zone	340,145	34
	Guinea zone; Savanna; Sudanian Zone	152,304	15
Production System	Rainfed	1,010,281	100
Maturity	Mid	517,832	51
	Early	340,145	34
	Late	152,304	15

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C. Target Product Profiles and Breeding Pipelines

Seed Product Market Segment	Target Product Profile	Breeding Pipeline	Breeding Effort
<u>Millet Pearl WAF MS00641</u>	<u>Millet Pearl WAF CIMMYT TPP00319</u>	Millet Pearl CIMMYT BP00139	Category 1: Full
	<u>Millet Pearl WAF ICRISAT TPP00429</u>	Millet Pearl ICRISAT BP00168	Category 1: Full
<u>Millet Pearl WAF MS00642</u>	<u>Millet Pearl WAF CIMMYT TPP00331</u>	Millet Pearl CIMMYT BP00141	Category 4: Late Testing
<u>Millet Pearl WAF MS00643</u>	<u>Millet Pearl WAF CIMMYT TPP00329</u>	Millet Pearl CIMMYT BP00140	Category 1: Full
	<u>Millet Pearl WAF ICRISAT TPP00430</u>	Millet Pearl ICRISAT BP00169	Category 1: Full
<u>Millet Pearl WAF MS00644</u>	<u>Millet Pearl WAF CIMMYT TPP00330</u>	Millet Pearl CIMMYT BP00141	Category 1: Full
	<u>Millet Pearl WAF ICRISAT TPP00431</u>	Millet Pearl ICRISAT BP00170	Category 1: Full
<u>Millet Pearl WAF MS00646</u>	<u>Millet Pearl WAF CIMMYT TPP00332</u>	Millet Pearl CIMMYT BP00140	Category 2: Early and Late Testing

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D. Mapping Traits from TPPs and MI Evidence to Value Propositions

Value Proposition	Essential improved traits from 8 TPPs*	Key traits from MI Evidence
01 Farmer • Higher Productivity	- Grain Yield (8) - Panicle length (3)	High grain yield
02 Farmer • Higher fodder yield or value	Fresh Biomass (2)	High stover yield/Stover palatability
03 Farmer - Less Loss & Risk - CC relevant stress	No essential traits to be improved	Drought tolerance/resistance
04 Farmer • Less Loss & Risk: Biotic stress	- Downy Mildew Resistance (8) - Striga resistance (2)	Striga resistance
07 Farmer • Greater fertilizer use efficiency	No essential traits to be improved	High Nutrient Use Efficiency (NUE)
08 Farmer • Less labour	Threshing ability (1)	No key traits found from MI evidence
09 Farmer • Appropriate maturity	Maturity (2)	Early maturity
10 Farmer/user • Longer storage life	No essential traits to be improved	Lipase Stability
11 User • Less labour	No essential traits to be improved	- High threshing percentage/Ease of threshing - Easy-threshing - High flour yield/High proportion of floury endosperm
12 User - Meeting end-user requirements	No essential traits to be improved	- Light grey/white seed color - Endosperm starchiness/Grain hardness - Grain sweetness/Sugar content - Food stability/Texture retention - High flour yield and starch viscosity
13 User • Better nutrition and/or health	Iron, Fe (3)	- High grain Fe and Zinc content - Biofortification (High Fe and Zn content) - Low tannin and phytate content

* Values in parentheses () reflect the frequency of appearance of each essential improved trait across the active TPPs.

See **Section E** for reference

Note: "Essential: Maintain" and "Nice-to-Have" traits of TPPs are not included in the table

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D. Mapping Traits from TPPs and MI Evidence to Value Propositions

List of Value Propositions

- **01 Farmer • Higher Productivity:** More yield in a representative target environment.
- **02 Farmer • Higher fodder yield or value:** More fodder: yield and quality (like digestibility)
- **03 Farmer • Less Loss & Risk: CC relevant stress:** Avoided yield losses and more production stability in the face of climate change-relevant shocks and stresses such as drought, excess water (excessive rains, waterlogging, submergence, typhoons), heat, and salinity
- **04 Farmer • Less Loss & Risk: Biotic stress:** More production where and when this pest or disease occurs.
- **05 Farmer • Less Loss @ Location:** Crop production in less favorable environmental conditions, such as cold, acidity, alkalinity, shade, salinity, iron toxicity.
- **06 Farmer • Less Loss – Other:** Less loss in the field due to shattering or lodging.
- **07 Farmer • Greater fertilizer use efficiency:** Less need for fertilizer, more production at low levels of fertilizer, biological nitrification inhibition (BNI).
- **08 Farmer • Less labour:** Ability to mechanize. Less work and drudgery for weeding, harvesting and on-farm sorting.
- **09 Farmer • Appropriate maturity:** Better fit in the cropping system. Varieties that may induce early maturity or prolong the time it takes to harvest the crop.
- **10 Farmer/user • Longer storage life:** Longer storage with fewer losses. Other avoided losses due to processing?
- **11 User • Less labour:** Less labour for home processing (peeling/shelling ability (incl. shape), cooking time).
- **12 User • Meeting end-user requirements:** Product meets market intermediaries/end-use requirements in critical aspects. Physiological improvements that focus on standards/qualities of formal markets (e.g. color, size, texture, protein)
- **13 User • Better nutrition and/or health:** More nutritional and/or healthier product regarding protein, fiber, iron, zinc, beta-carotene and toxins. When combined with awareness raising and nutrition education, results in higher (induced) demand.
- **14 Multiplier – Easier to multiply:** Lower costs to multiplier; greater seed availability to farmers.
- **15 Other:** Undefined value to farmer, end user, or multiplier

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E. Synthesis of evidence highlighting key traits by thematic area

Overview (Pearl Millet)

The revitalization of Nigeria's pearl millet sector is currently hamstrung by systemic failures, including "patchy" institutional linkages and outdated research infrastructure at the Lake Chad Research Institute (LCRI). These bottlenecks exacerbate an estimated 27.3% adoption gap, forcing smallholders to rely on recycled landraces that yield 40% less than the potential of improved technology. To bridge this gap, breeding must prioritize early maturity as a vital "drought escape" tool against unpredictable rainfall and recognizable morphological markers to ensure variety purity within informal seed networks where formal certification is often absent. Furthermore, to mitigate the "time poverty" of women processors, the sector requires a focus on high threshability to reduce manual drudgery alongside low lipase activity to solve the chronic flour rancidity issues that currently limit commercial market expansion.

1. Consumers

- **High grain Fe and Zinc content** : Required to address high rates of malnutrition and anemia among women and children in the Sahel.
- **Light grey/white seed color** : Essential for producing visually appealing traditional beverages and soft drinks.
- **Endosperm starchiness/Grain hardness** : Required to provide the specific "cook sensations" necessary for the staple dish Tuwo.
- **Grain sweetness/Sugar content** : Necessary to meet traditional sensory standards for preparations like *fura*, *gumba*, and *kunu*.
- **Food stability/Texture retention** : Needed to ensure high "overnight keeping quality" for household food security and waste reduction.

2. Processors

- **High threshing percentage/Ease of threshing** : Required to solve the technical bottleneck of manual separation and reduce physical drudgery for processors.
- **High flour yield/High proportion of floury endosperm**: Necessary to maximize the output of edible material per unit of raw grain for economic viability
- **Lipase Stability** : Essential for reducing endogenous lipase levels to prevent rapid flour deterioration and off-flavor development.
- **Low tannin and phytate content** : Required to prevent the chelation of essential minerals and improve the sensory appeal of flour.
- **Recognizable morphological markers** : Crucial for informal seed identification and maintaining purity within farmer-to-farmer exchange networks.

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E. Synthesis of evidence highlighting key traits by thematic area

3. Producers

- **Early maturity** : The most critical requirement to allow crops to escape late-season drought and provide food during the "hungry period".
- **High grain yield** : Required to maximize total output per unit of land for household food security and sales surplus.
- **Drought tolerance/resistance**: Essential for survival in the arid and semi-arid zones of Northern Nigeria characterized by variable rainfall.
- **Striga resistance** : Necessary inherent protection to avoid total crop failure in infested fields.
- **High stover yield/Stover palatability** : Critical for integrated crop-livestock systems to provide a vital feed source for smallholder livestock.

4. Gender & Social Inclusion

- **Easy-threshing** : Specifically required to reduce the manual labor intensity and "time poverty" predominantly experienced by women processors.
- **Biofortification (High Fe and Zn content)** : Aligns with women's strong interest in nutrient-dense foods for household health and child development.
- **High Nutrient Use Efficiency (NUE)** : Essential for women who often farm on marginal, low-fertility lands with minimal access to inorganic fertilizers.
- **High flour yield and starch viscosity** : Required to meet women's tacit knowledge requirements for specific food textures like *tuwo*.
- **Processability** : Optimized fermentation or expansion traits needed to enhance the viability of small-scale female-led enterprises like *kunu* or *masa*.

5. Enabling Environment

- **Upgrading research infrastructure (Irrigation/Storage)**: Necessary to improve the volume and quality of early-generation seeds available for multiplication.
- **Community-Based Seed Production**: Institutional fix required to empower farmer groups to produce traceable, quality seeds within local communities.
- **Investment in rural feeder and paved roads**: Critical infrastructure fix to facilitate market-oriented production and grain movement.
- **Inclusion in Anchor Borrower's Program**: Policy fix needed to provide pearl millet farmers with essential credit access currently focused on rice and maize.
- **Revitalizing advisory services**: Institutional fix to replace top-down extension with participatory Farmer Field and Business Schools (FFBS).

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E. Synthesis of evidence highlighting key traits by thematic area

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Annex 1. Insights from Market Intelligence Publications

No data available

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Annex 2: Requests for MI Evidence from PDT Meetings

MI Researchable Questions	Value Chain	Regional Crop Network	CGIAR coordinating Center	Network Priority
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No data available

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Annex 3: Definitions of commonly-used terms

Terms	Description
Market Segment or Seed Product Market Segment (SPMS)	A group of farmers with common product needs, driven by consumer and processor requirements (what) combined with a set of farmer requirements based on where and how the product is grown.
Market Segment Criteria	The eight criteria used to identify and define a market segment. Not all market segments will require all criteria to be identified e.g. maturity is not relevant for perennial crops. Non-applicable terms are captured as NA. To begin with, Market Segments were captured at the subregional level. • Crop: A crop in the CGIAR crop breeding portfolio. What entails a crop (as compared to a germplasm type) follows the convention what FAO defines to be a crop, so interoperability with FAO data sets can be ensured. Germplasm Type are used for subspecies (e.g. Plantain and Banana, Durum and Bread (wheat) or other types of consistent subgroupings of crops between which crosses are rarely made (winter wheat, spring wheat). It is the crop's assessment whether and how they want to use this attribute. • Subregion: Subregion(s) and countries on where the crop is grown (MS subregions derived from the seven regions recognized by CGIAR). • Material Type: Hybrid or non-Hybrid • Consumer Product Type: The processor and consumer requirements for a product, how they choose to process the product. • Color: Color of the grain or flesh of the product required by a market segment. • Production Environment (Agroecological Zone): Geographical areas exhibiting similar climatic conditions that determine their ability to support agriculture, typically defined by their geography, humidity and elevation. • Production System: How the crop is grown • Maturity: Maturity of the crop required where the crop is grown.

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Annex 3: Definitions of commonly-used terms

Terms	Description
Target Product Profiles (TPPs)	Defined to understand what essential (and nice-to-have) traits are required in a new product to meet or exceed the needs of farmers, processors and consumers in one particular crop market segment.
Breeding Effort	The extent of effort put on closely related Target Product Profiles (TPPs) that derive from one Breeding Pipeline = crossing block • Category 1: Full: The TPP which is the main target of the breeding effort (= for which most resources are available) is called Category 1 TPP. The Category 1 TPP Essential Trait requirements define the crossing block, and the extraction of candidates for early stage testing, late stage testing and on-farm verification. A Breeding Pipeline can only have one Category 1 TPP. The other TPPs that derive from the same population improvement effort, are assigned Category 2, 3 or 4. • Category 2: Early and Late Testing: This category has a separate variety selection effort that selects different candidates from early stage testing, before proceeding to late stage testing and on-farm verification. This is typically the case when CGIAR breeding programs send the same set of lines, clones or hybrids for early testing to partners and these partners select (and/or extract in the case of segregating lines) different TPPs out of the materials received.. • Category 3: Backcrossing: This category differs from Category 1 by one or two simply inherited Essential Improve Trait(s) that can be achieved through backcrossing. • Category 4: Late Testing: This category has a separate variety selection effort that selects different candidates from late-stage testing, before proceeding to on-farm verification. • Category 5: None: This category is for Market Segments with no TPP defined or no TPP linked to a CGIAR Breeding Pipeline
Breeding Pipeline	The sum of the breeding efforts (product design, crossing and screening, early-stage testing, late-stage testing and on farm verification) focused on a market segment or on a group of similar market segments with very similar target product profiles ending with the identification of distinct products for each market segment the pipeline is focused on.

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Annex 3: Definitions of commonly-used terms

Terms	Description
Essential Traits	Traits must be at or above the threshold value in all new products for a market segment in order to meet/exceed farmer, processor, and consumer requirements.
Essential Improve Traits	Traits are deliberately being improved in the breeding scheme for a market segment.
Essential Maintain Traits	Traits are being maintained at their current level in the breeding scheme for a market segment.
Nice-to-Have Traits	Traits do not need to be in all new products for a market segment to meet/exceed farmer, processor, and consumer requirements.

Value Proposition

Value Proposition is both a strategic and a marketing concept. Value propositions identify the benefits that products (or services) will deliver to users. In the case of B4T, value propositions cluster Target Product Profile Traits with similar potential benefits. They help in (i) conceptualizing benefit projections, (ii) discussions of relative priorities of TPPs with users and stakeholders, and (iii) feasibility assessments of TPPs - the more value propositions are being pursued through the same Target Product Profile, the less progress will be made for every individual value proposition and the less feasible is meaningful impact. These groupings therefore, provide a practical handle on the substantial set of traits considered in the TPPs.

References:

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- CGIAR Breeding Portal User Manual version 5.0 [unpublished document]

About this Market Intelligence Digest

The **Market Intelligence Digest** provides concise, evidence-based guidance to support **Product Design Team (PDT) discussions** in line with CGIAR **Product Design Standards**. It synthesizes market intelligence insights to inform market segmentation, trait prioritization, and advancement decisions within existing breeding pipelines. By complementing technical breeding data, the Market Intelligence Digest helps PDTs clarify the relevance of market segments, demand signals, and adoption considerations for product design decisions.

This series is a collaborative effort of CGIAR centers and partners working on CGIAR Market Intelligence. The views and opinions expressed in this publication are those of the authors and are not necessarily representative of or endorsed by CGIAR.

Recommended citation

Global Market Intelligence Platform. 2026. Market Intelligence Digest: Millet | Nigeria [English version]. Generated on April 16, 2026. Los Baños, Laguna

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