Success Pathways for Scaling Biofortified Crops

HarvestPlus

IFPRI INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

CGIAR

SOLUTIONS

Driving Impact at Scale

HarvestPlus (IFPRI)
Research & Innovation Engine

- Develops the science — breeding nutritious crops with CGIAR centres
- Generates evidence of impact
- Engages on policy and establishes global norms for biofortification

HarvestPlus Solutions (HPS)
Commercial Scaling Engine (est. 2018)

- Market-oriented intermediary alongside private sector & governments
- Drives commercialization and builds market linkages
- Focused on financial sustainability at scale

Together: an end-to-end model — from lab to last mile

Scaling Biofortified Crops in Global South

David Spielman – Senior Research Fellow IFPRI

Brenda Mareri – Regional Manager Africa, HarvestPlus Solutions

- Active in: Kenya • Nigeria • Tanzania • Malawi • Zambia • Zimbabwe • Uganda • DRC • Bangladesh • India • Indonesia • Pakistan

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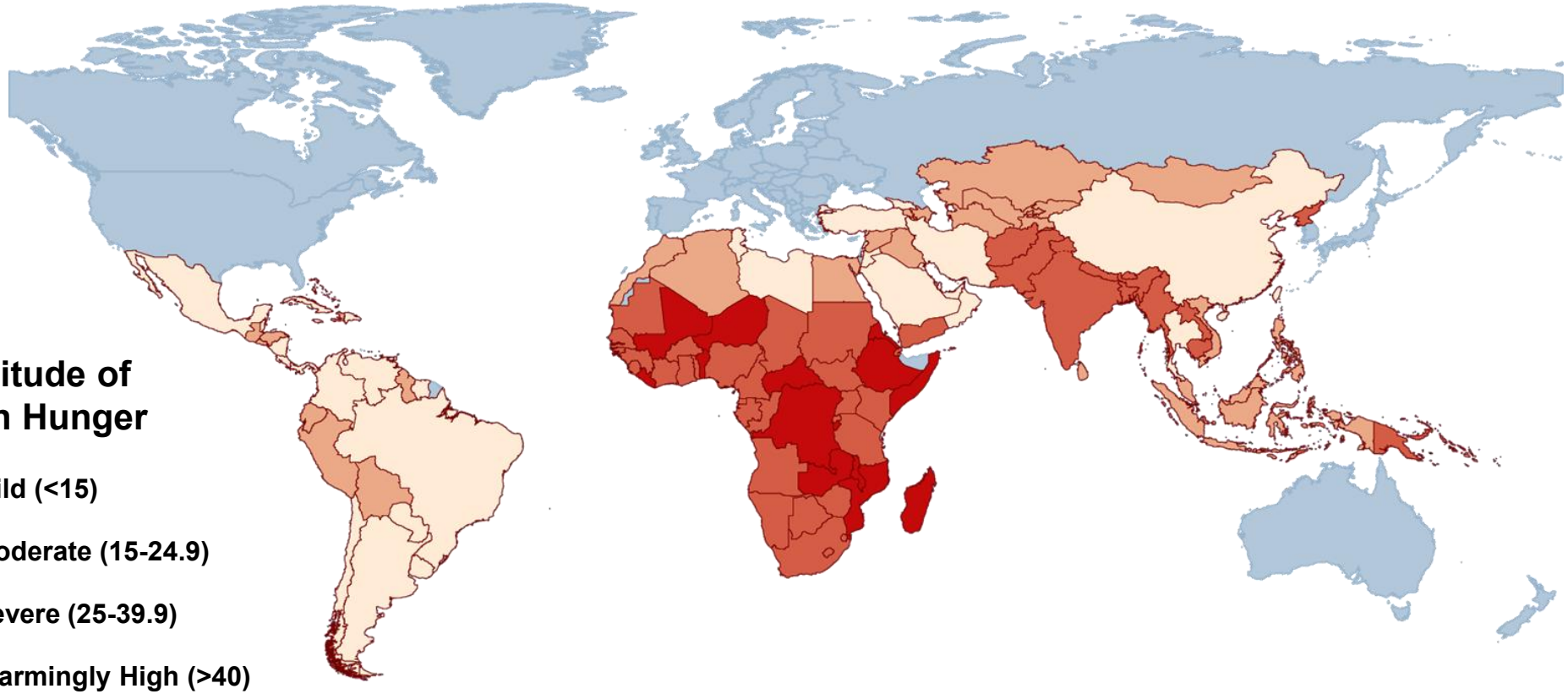
Micronutrient Deficiency or "Hidden Hunger"



More than 2 **BILLION** people are affected, primarily in low- and middle-income countries

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Strategies for Addressing Hidden Hunger

A nourishing, diverse diet is the ideal strategy…

…but many people can't afford or access the right mix of foods (fruits, vegetables, grains, animal source foods)

Complementary nutrition strategies

Biofortification
of staple foods
(an up-front investment)

Fortification
added to foods
(a recurring investment)

Supplementation
Consumed as pills, powders, drops, etc. (a recurring investment)

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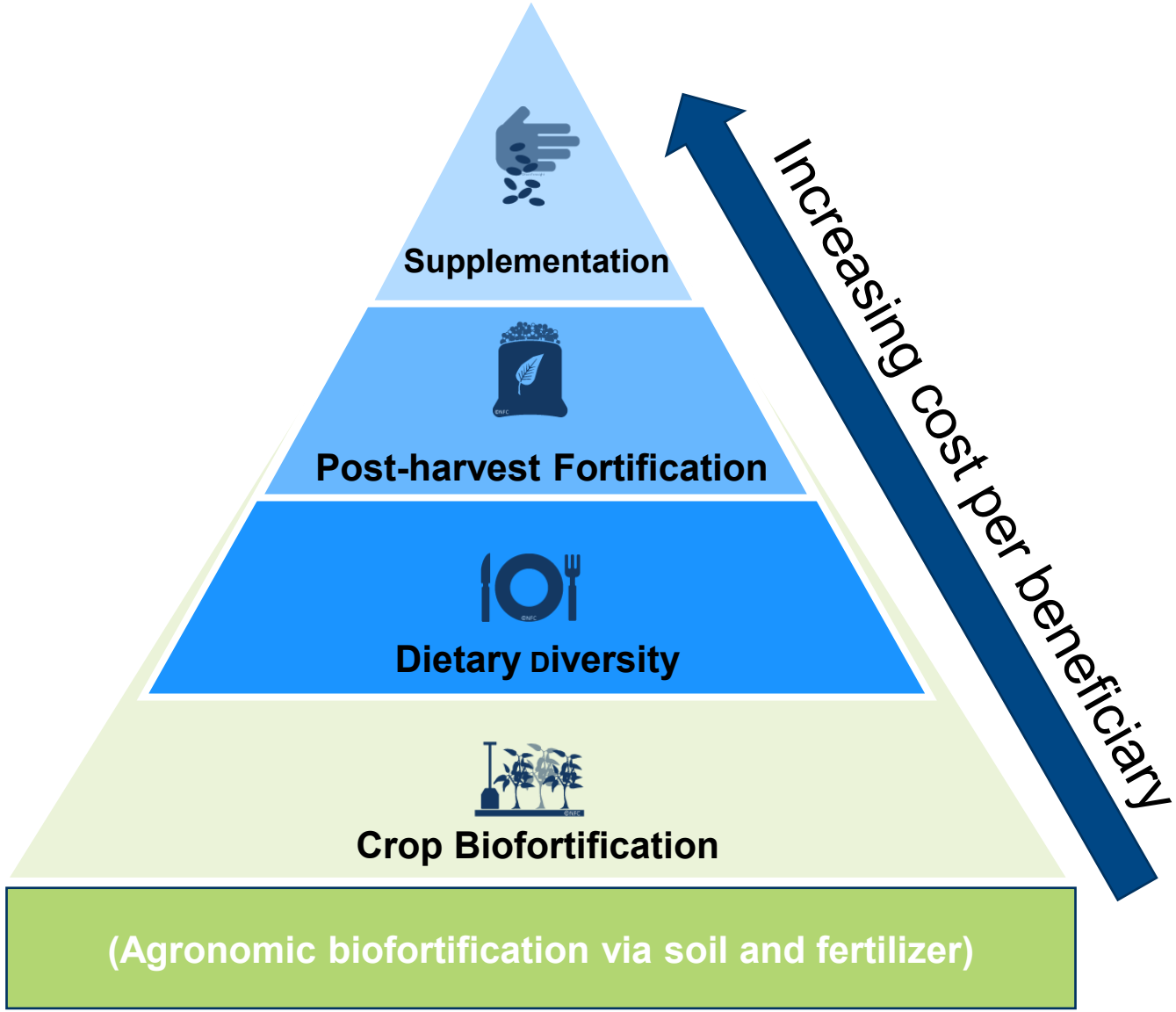
Biofortification and cost-effectiveness



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The challenge: Scale and evidence

How do we scale biofortified crop production *and* consumption?

- Multiple pathways
  - Ensure yield gains, yield stability for farmers
  - Create genuine opportunities to improve nutrition via consumption
  - Create commercial opportunities to improve incomes via marketing

Iron Pearl Millet
Provides **up to 80%** of daily iron needs

Zinc Wheat
Provides **up to 50%** of daily zinc needs

Vit A Sweet Potato
Provides **up to 100%** of daily vitamin A needs

Zinc Rice
Provides **up to 40%** of daily zinc needs

Vitamin A Maize
Provides **up to 50%** of daily vitamin A needs

The challenge: Scale and evidence

How do we generate credible evidence of both "reach" (scale) and "benefit" (impact)?

- Adoption studies using national surveys, genotyping, other methods
- Impact evaluations using rigorous strategies for causal identification
- Randomized trials that combine multiple interventions

Heat and drought tolerant iron beans

Drought tolerant vitamin A maize

Iron cowpea requiring low levels of water

Heat tolerant iron pearl millet requiring low levels of water

Biofortification as Our Case Study

Biofortification sits at the intersection of agriculture, nutrition, public policy, and private sector investment

Invisible Trait: Nutrition

The nutritional benefit is in the seed — farmers cannot see it. Scaling requires awareness, trust, and demand creation.

Visible Trait: Agronomic Performance

Yield, drought tolerance, and disease resistance are visible to farmers — these drive initial adoption decisions.

Conventionally Bred (Non-GMO)

490+ varieties using traditional breeding — compatible with existing seed systems and farmer practice.

Multi-Sector Scaling Challenge

Requires government policy, private investment, and consumer demand working in unison — a uniquely complex challenge.

Why Scaling Matters — Now

A development priority AND a climate adaptation strategy

1. The potential is far greater

651 million reached is an extraordinary achievement — yet billions more remain.

2. Climate change is an urgent threat

Zinc, iron, and protein in wheat and rice are projected to decline significantly by 2050. Biofortification is a climate adaptation strategy.

3. Innovation that never reaches scale is innovation lost

Today we share what actually works — through real country examples.

The Scaling Journey: From Pilot to System

Phase 1
Development
2003–2012

The science was proven. Nutritious crop varieties bred and established. Evidence base built.

Phase 2
Delivery
2013–2018

Rural smallholder adoption established. Demand creation and awareness built. First market linkages formed.

Phase 3
Scaling
2019–Now

Impact at national scale. Embedded in seed systems. Traded in markets. Financial sustainability without continuous donor subsidy.

2025 Results Snapshot

651M
People eating biofortified food in 13 countries

$11B
Total value of harvested biofortified crop

50%
Of total crop area in record-setting countries

291K MT
Certified biofortified seed ($184M retail value)

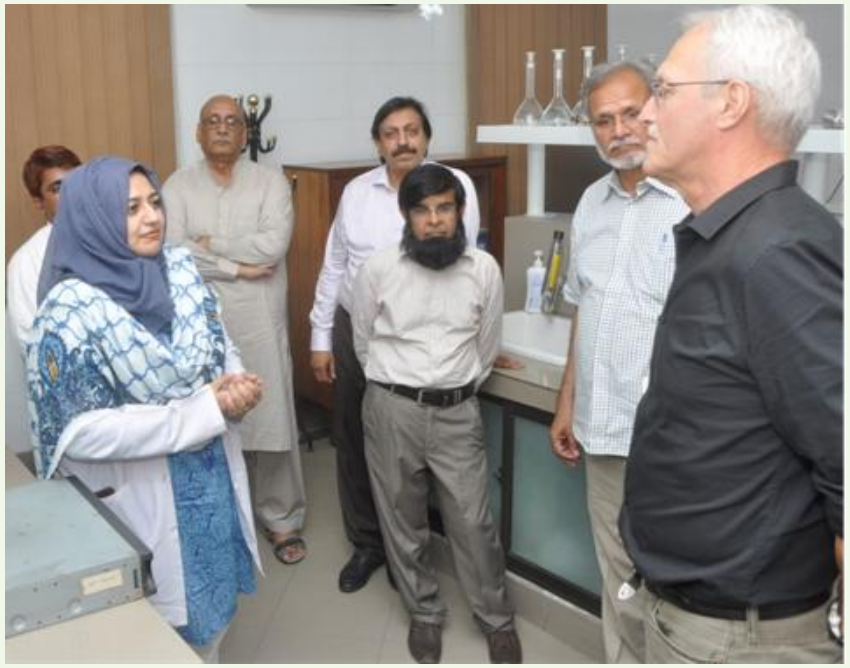
Spotlight — Pakistan: High-zinc wheat accounts for ~50% of national production — approximately 15 million metric tonnes

14% of beneficiaries are children under 5 (6–59 months) • 30% are school-age children (6–18 years)

These are not projections. These are results.

Public Policy Creating a Favorable Environment for scale

Pakistan Case Study for Scaling Zinc Wheat



Dr. Javed Ahmed – Chief Scientist, Director
Wheat Research Institute Faisalabad, Pakistan

Introduction and Background

- One quarter of the Pakistan’s population is living below the national poverty line and 39% is poor (FAO 2022).
- 40% children under 5 years old are stunted.
- More than **50 million** people in Pakistan has inadequate zinc intake (19% of Pakistani children under five and 22 % of WRA).
- Wheat is the main staple crop contributing 72 percent of Pakistan's daily caloric intake.
- Biofortification of wheat is one of the most suitable and sustainable interventions to address zinc deficiency.
- It reaches the most vulnerable people, living in remote rural areas with no access or money for fortified foods.

Enabling Environment for Biofortified Crops

- Partnership between HarvestPlus and Wheat Research Institute
- Micronutrient testing and investment in EGS for biofortified crops
- Government investment on inputs and inclusion of zinc wheat seed into subsidy plan signaling private sector for investment and adoption
- Strengthen seed systems through partnership with private sector seed companies
- Targeted demand creation for farmers through radio, digital media, extension workers, civil society, and university students through wheat campaigns
- Multi-sectoral nutrition policy highlighting government priorities for nutrition sensitive agriculture initiatives including promotion of biofortified crops

WHEAT RESEARCH A.A.R.I. FAISALABAD

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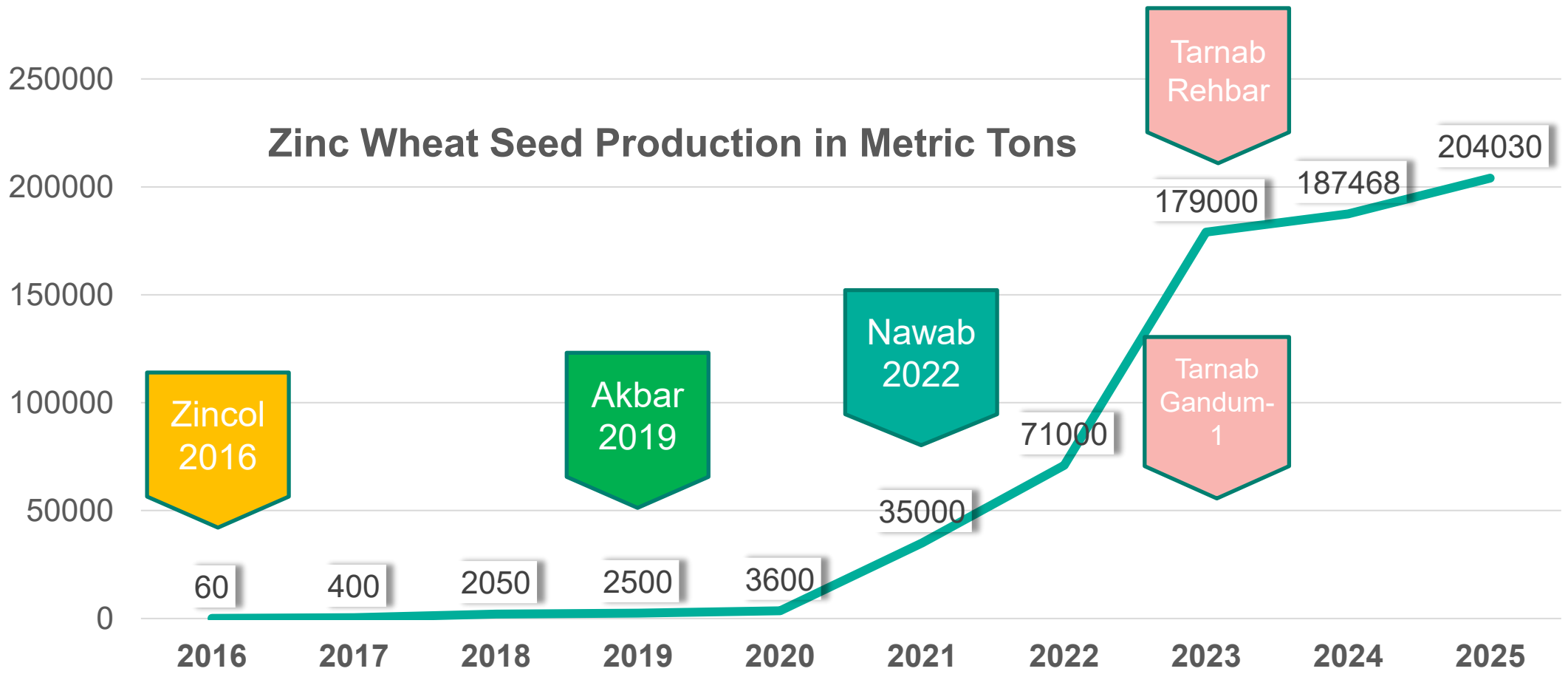
Better Crops • Better Nutrition

Zinc Wheat Variety Release at Glance



Building Pipeline for Biofortified Wheat Varieties

Genotypes	Zinc (ppm)	% increase over		
		Akbar-2019	Zincol-2016	Other varieties
V-20330 (Recommended by VEC)	40.4	6.9	11.9	61.6
V-16024 (NUWYT)	41.0	8.5	13.6	64.0
V-17086 (NUWYT)	40.0	5.8	10.8	60.0
Akbar-2019	37.8	-	4.7	51.2
Zincol-2016	36.1	-	-	44.4
Pakistan baseline	25.0	-	-	-

Key Results

- 198 million people eating zinc wheat – 78% of the population
- 45 % of wheat crop area planted with biofortified wheat
- Over 14 million metric tons of zinc wheat grain harvested in 2026
- USD 82 million investment mostly by private companies in seed sector
- USD 5 billion value of grain harvested in 2026
- 4.3 million farmers growing zinc wheat
- 27 million people reached through targeted awareness campaigns – Radio, digital media, farmers field days, gender trainings etc

The Journey of Scaling: Zinc Wheat in Pakistan

The case of zinc-biofortified wheat in Pakistan shows how HarvestPlus and national partners have applied a time-tested scaling model to reach 1.4 million households, comprising 7 million people, with this nutritious wheat in only six years since the scaling work began.

MORE...

Also: Pakistan Ramps Up Production of Zinc-biofortified Wheat Seed

https://www.brecorder.com/news/40269306?ref=whatsapp

PAKISTAN PRINT 2023-10-22

Extreme weather variability: Experts call for switching to biofortified crops to deal with malnutrition challenge

Recorder Report Published October 22, 2023

Facebook Twitter Whatsapp Comments

Way Forward

- Mainstream biofortification in the food systems – continue developing climate resilient nutrient dense crop varieties.
- Increase production, awareness, and supply of biofortified zinc wheat and other nutrient dense crops.
- Continue building capacity of value chain actors in the production, processing, and marketing of biofortified seeds, grains, and food products.
- Ensure market penetration of biofortified foods and food products through their integration in markets.

Private Sector Engagement to Catalyze Impact

Nigeria Case Study – Scaling Vitamin A Maize

Dr. Yusuf Dollah – Country Manager Nigeria, HarvestPlus Solutions

Dr. Afolabi Samson – Research and Production, Premier Seeds Nigeria

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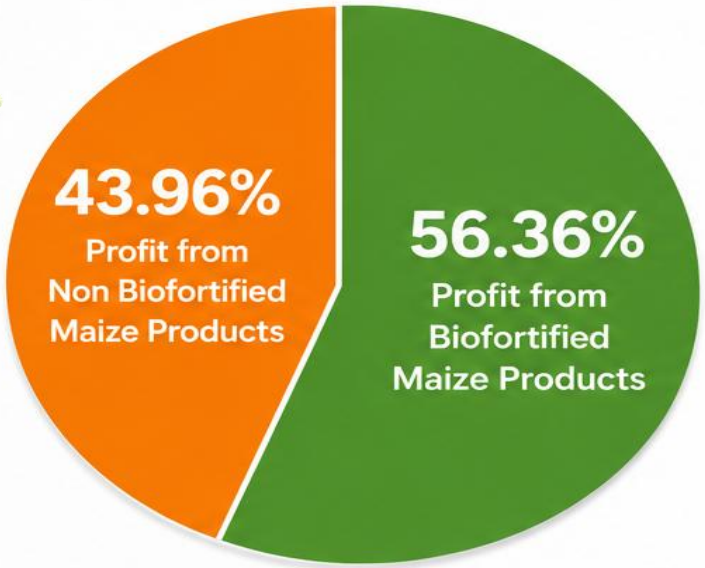
Profitability Comparison

All Products Utilized the Same Factors of Production

Maize Products Profitability

Biofortified Maize vs. Non Biofortified Maize



Non Biofortified Maize Products
43.96%
(Profit Share)

Biofortified Maize Products
56.36%
(Profit Share)

Biofortified maize products generate 56.36% of total profit—12.40 percentage points higher than non biofortified maize products.

Millet Products Profitability

Biofortified Millet vs. Non Biofortified Millet

Non Biofortified Millet Products
40.06%
(Profit Share)

Biofortified Millet Products
58.02%
(Profit Share)

Biofortified millet products generate 58.02% of total profit—17.96 percentage points higher than non biofortified millet products.

Conclusion: Biofortified products from both maize and millet deliver higher profitability compared to their non biofortified counterparts when the same factors of production are used.

Accelerated Release & Commercialization Model

Key Driver to Accelerated Cmmercializaion

Pre-Release EGS Multiplication → Seed Coy Integration → Agrodealer Integration → Producers → Aggregation & Industrial Utliization → HH Utilization → Sales & Distri

Govt. Agencies	Seed BMO's	Grain Transformation	Agric. Dev. Projects	Media & Events
• Nat. Agric. Seed Council • National & Int Res. Inst.	• Seed Ass. Of Nigeria • Farmer Ass • Agri Input Dealers Ass	• Food Processors (e.g.Tolaram) • Large Sc. Aggregators • Commodity brokers	• Agric Extension System. • CHEW's • Development Org. • Humanitarian & Fragility Operators, NGO's	• Farmer Radio Prog • Seed Fairs • Food Fairs • Field Days

OVER 21 POLICY DOCUMENTS

Enabling Environment

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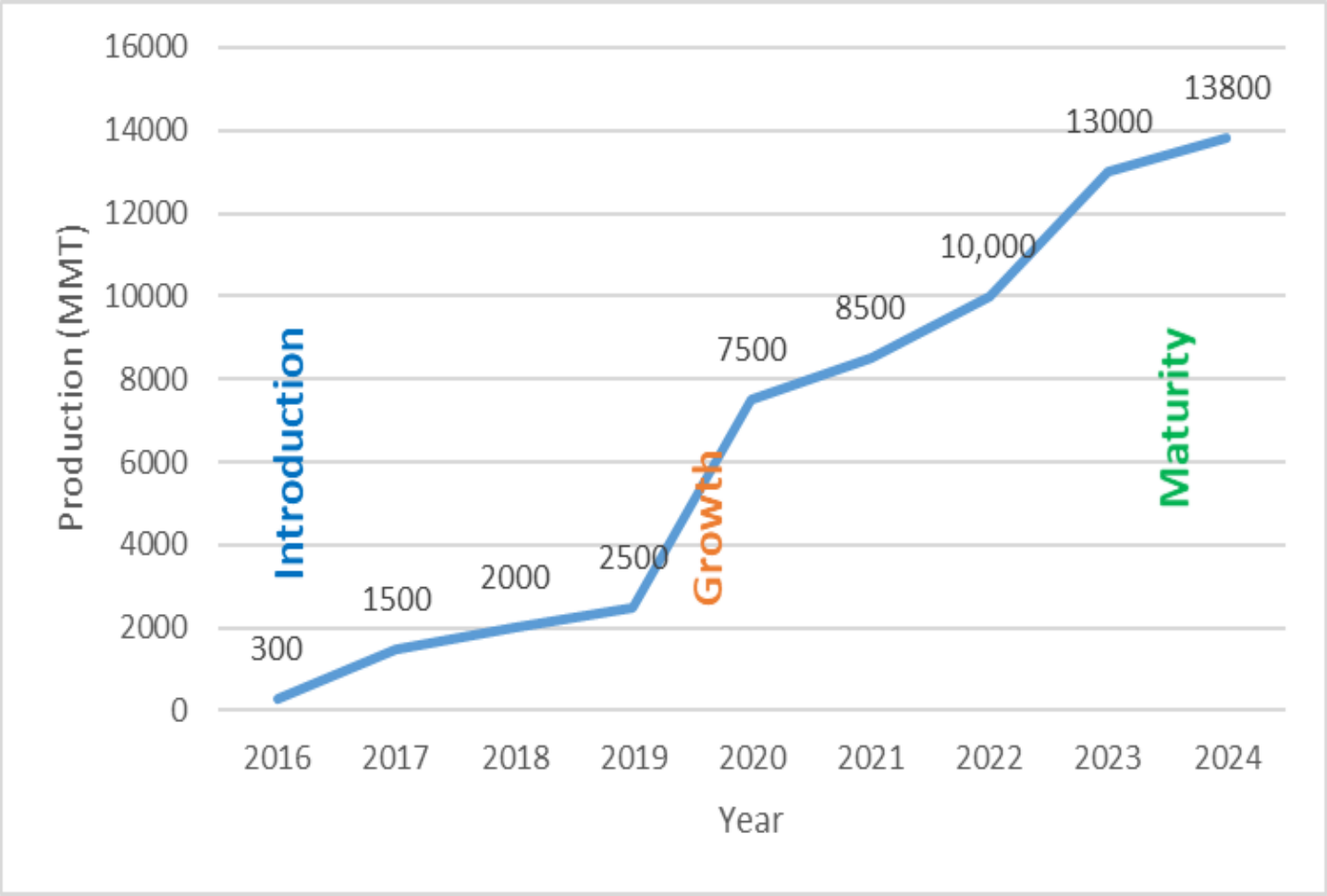
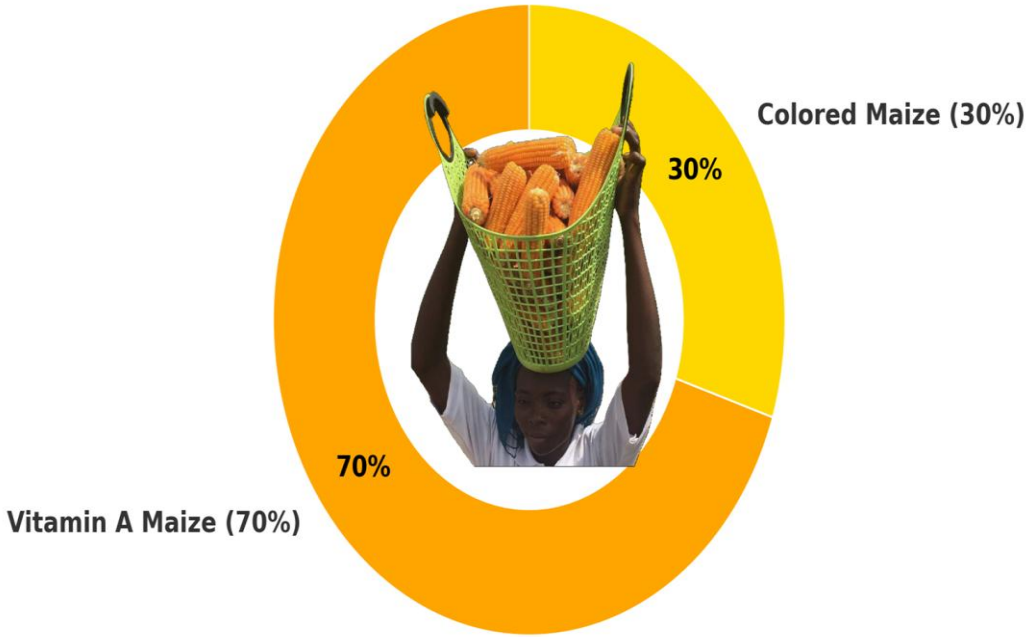
Seed to Scale - Vitamin A Maize Impact in Nigeria



Market Share

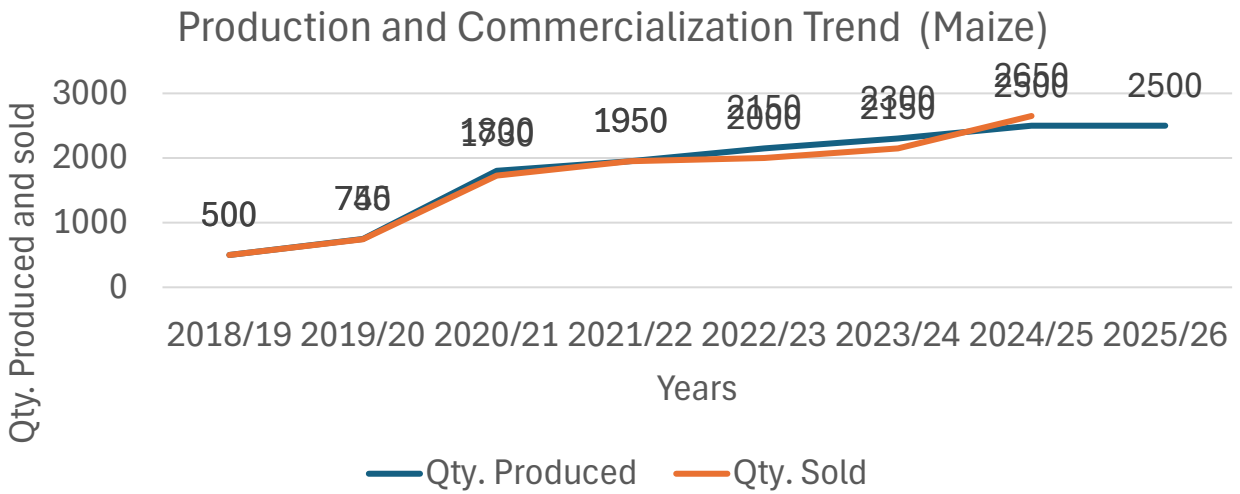
Vitamin A Maize vs Colored Maize

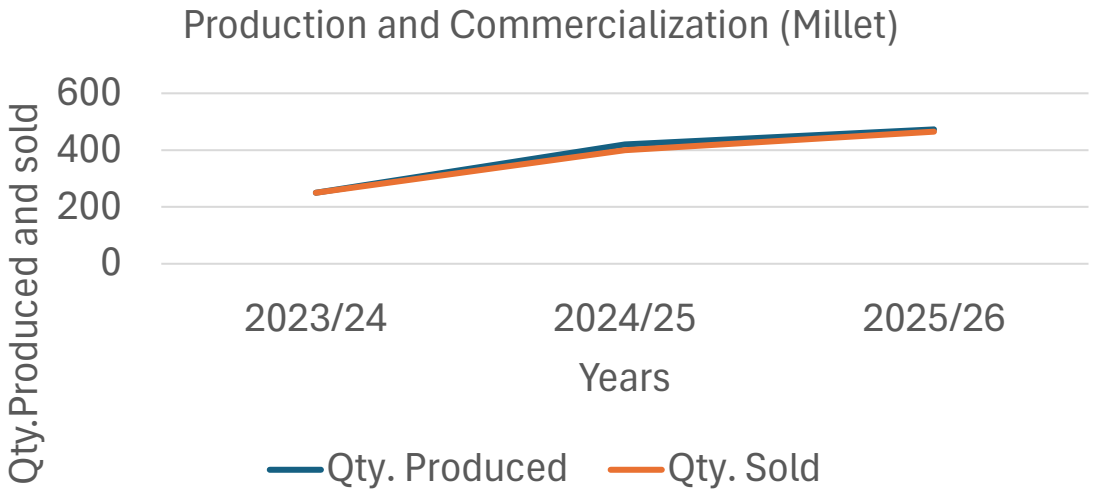


Year	2016	2017	2018	2019	2020	2021	2022	2023	2024
Consumption of VAM	54,880	254,794	529,949	732,935	756,258	1,571,779	1,752,529	1,962,832	2,023,890

Production and sales trends of biofortified crops

- Premier Seeds has been actively involved in the production and dissemination of certified seeds of biofortified crops in Nigeria since **2019**, beginning with the release of the first sets of provitamin A maize varieties.
- This was followed by the introduction of two high-iron pearl millet varieties, and most recently, the recently released two zinc-enriched rice varieties, further strengthening the company's contribution to improved nutrition and food security in the country.
- Since then, the company has continued to expand its portfolio and outreach, contributing to improved nutrition and food security.
- Over the past six years, about **15,000MT** of improved seeds of biofortified crops were produced and disseminated to farmers across Nigeria.
- We are also currently the first private company to invest in the multiplication of two zinc-enriched rice varieties, reinforcing our commitment to advancing biofortification and improving nutritional outcomes.
- The company has invested over **$3.4million** naira in the production and dissemination of the certified seeds of biofotified crops alone in the last 6 years.

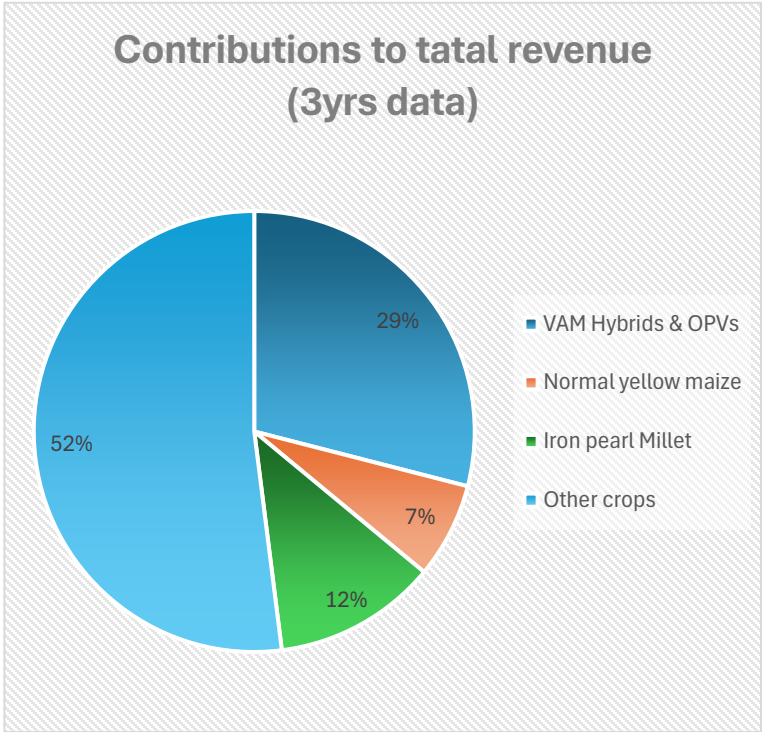




The total of 2,450MT of PVA maize seeds was produced and sold in 2023/24 is estimated to have been used to establish over 125,000ha and will deliver over 625,000MT biofortified maize grains to the market.

Strategies deployed to enhance the accessibility of certified seeds of biofortified crops

- 28 Zonal Offices across 28 states of Nigeria
- Use of Rural Sales for last mile delivery of seed and advisories
- Partnerships with aggregators and processors (end users) within the commodity value chains
- Other demand creation and promotional activities such as Demo plots, flyers, radio jingles……



Scaling production and dissemination of BF crops

- Increased supports to out-growers to scale up seed production (input finance, technical support and premium price at buy-back time).
- Invested in the official registration, release and commercialization of new high yielding resilient biofortified crop varieties (Oba super 8, released in 2024).
- Expanded seed **production and commercialization** to **Jigawa and Gombe states** specifically for millet, cowpea and rice production
- Strengthened Collaborations with **aggregators, processors** and **other stakeholders** in the commodity value chains for seed supplies to their farmer networks.

Question and Answers

Key Takeaways and Closing

Arun Baral – Chief Executive Officer, HarvestPlus


Thank You