



The Journey of Scaling in Pakistan

Zinc-Enriched Biofortified Wheat



3.5 million
metric tons of zinc wheat
grain produced in 2021

How do we ensure that biofortified crops are sufficiently and sustainably scaled to reach all farming families who can benefit from them, and that the benefits also can be extended to all consumers in food markets?

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.

Two billion people—one quarter of the world’s population—do not get enough vitamins and minerals in their diets. This “hidden hunger” causes serious health and developmental problems, as well as billions of dollars in health care costs and economic losses, primarily in low- and middle-income countries.

For the past two decades, the CGIAR’s HarvestPlus program has led an effort to address hidden hunger with biofortified, micronutrient-enriched varieties of common staple food crops that are scientifically shown to improve nutritional status and health. In collaboration with CGIAR and country partners, nearly 400 varieties of these conventionally bred, “biofortified” crop varieties have been released in 40 countries. Nearly 10 million families (comprising about 48.5 million people) are currently growing them.

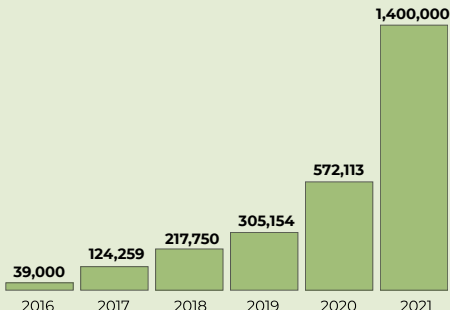
In Pakistan, the International Maize and Wheat Improvement Center (CIMMYT) developed the zinc wheat varieties and the national agricultural research system was responsible for local testing and research.

Biofortification is being used to help address a malnutrition problem that costs Pakistan nearly US\$3 billion in GDP annually. A key contributing factor is that more than 60 million people in Pakistan have inadequate daily zinc intake—a group that includes one in five Pakistani children.

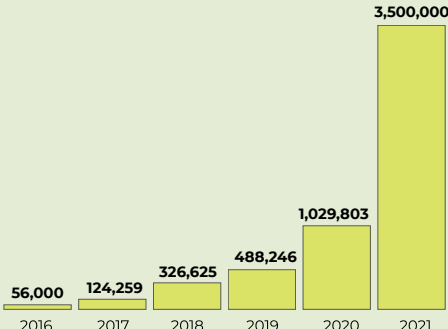
Pakistan is also one of the leading wheat-consuming countries in the world, with average daily per-capita consumption of 240 grams of wheat. Overall, wheat flour contributes 72 percent of Pakistanis’ daily caloric intake, which would make wheat a prime vehicle to tackle zinc deficiency.

This paper will be beneficial to those intending to design innovative programs for scaling up biofortification. In just six years since its introduction in Pakistan, zinc wheat seed is now 20 percent of the wheat seed market, largely due to the activities of the HarvestPlus program. Scaling is a continuous process which will require commitment to reach a tipping point when zinc wheat is the market leader in seed, grain, and food markets.

Estimated Number of Households Growing Zinc Wheat in Pakistan



Estimated Zinc Wheat Production in Pakistan, in Metric Tons

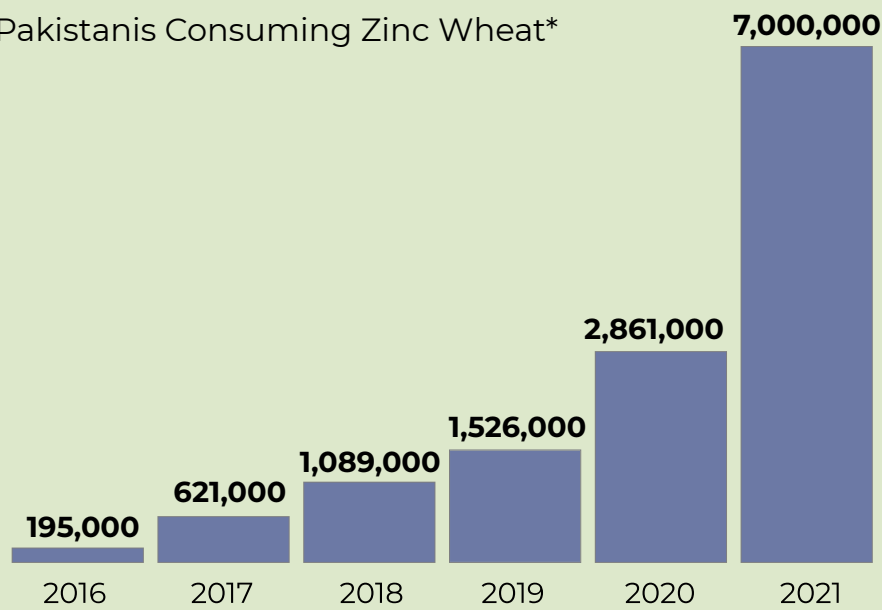


For the 2021/22 season it is expected approximately 55,000 tons of zinc wheat seed will be produced, which will be 20% of the certified seed market.*

* 55000 tons of formal sector seed will produce 2.75 million tons of grain. Farm saved seed will also increase this number.

Source: HarvestPlus monitoring data

Number of Pakistanis Consuming Zinc Wheat*



The path from zero to 7 million people

Market Introduction: Seeds released for commercialization

In this first phase, HarvestPlus took a leadership role in promoting zinc wheat breeding and release. In order to fast-track zinc wheat for market release, expert breeders follow the steps of variety design, discovery, development, screening, characterization and selection of candidate varieties, large scale national testing, and, finally, seed product launch. The HarvestPlus approach was informed by close analysis of the seed system, and implemented through effective partnerships with local and international partners.

Scaling: Igniting demand and fueling supply

The scaling phase began in 2015 after several years of laying the groundwork, primarily through government engagement and kickstarting seed production. HarvestPlus then began work with Pakistani partners on a zinc wheat delivery program to take seeds, grains, and foods to market.

Once high-quality, competitive zinc wheat seed varieties were developed and supply was established, HarvestPlus launched a program to ignite demand to drive increased consumption and nutritional impact. Foods made from zinc wheat currently reach Pakistanis through home-grown crops, through urban and local markets, and increasingly as processed food products such as packaged flour, bread, noodles, and breakfast cereals. **HarvestPlus enables value chain partners at every point where a consumer might be able to access a product made with zinc wheat flour.** This delivery phase involves commercial seed markets and a non-commercial process of “diffusion,” whereby farmers share seeds with other farmers informally.

Transforming the food system, by scaling up production and consumption of nutrient-enriched foods within it, has two distinct strategies (described below), both of which are aimed at anchoring nutrient-enriched products in food supplies.

*Monitoring and evaluation data collects households reached. The average number of household members in Pakistan is 6.5, but HarvestPlus uses a conservative estimate of 5 people per household.



Strategy One: Fueling Supply. Enable seed production (particularly early generation seed or EGS) at sufficient levels and quality to facilitate access to it and create demand and promote adoption by smallholder farmers.

This supports grain production for both home consumption by farming families, and for use by small and medium (SME) food enterprises that require relatively small procurement volumes. During this phase, continual government engagement and endorsement is essential at every stage.

Strategy Two: Igniting Demand. Scale grain production to reach higher procurement volume from commercial supply chains and public procurement programs, such as food subsidy and school feeding programs.

This requires significantly higher and more-consistent seed and grain production. This part of the process relies on private sector commercial transactions and/or public food commercial procurement, and is often termed commercialization.

Shifting from scaling to anchoring

Anchoring means that nutrient-enriched grain production has been significantly scaled, such that the nutrient-enriched crop is fully embedded in the food system. For zinc wheat in Pakistan, it is estimated by HarvestPlus that anchoring (50 percent seed market share) can be achieved by 2030 given significant donor and investor support. Now is the time to ensure critical support to ensure momentum is maintained. Without this support, the current growth of market share of zinc wheat could potentially reverse course.

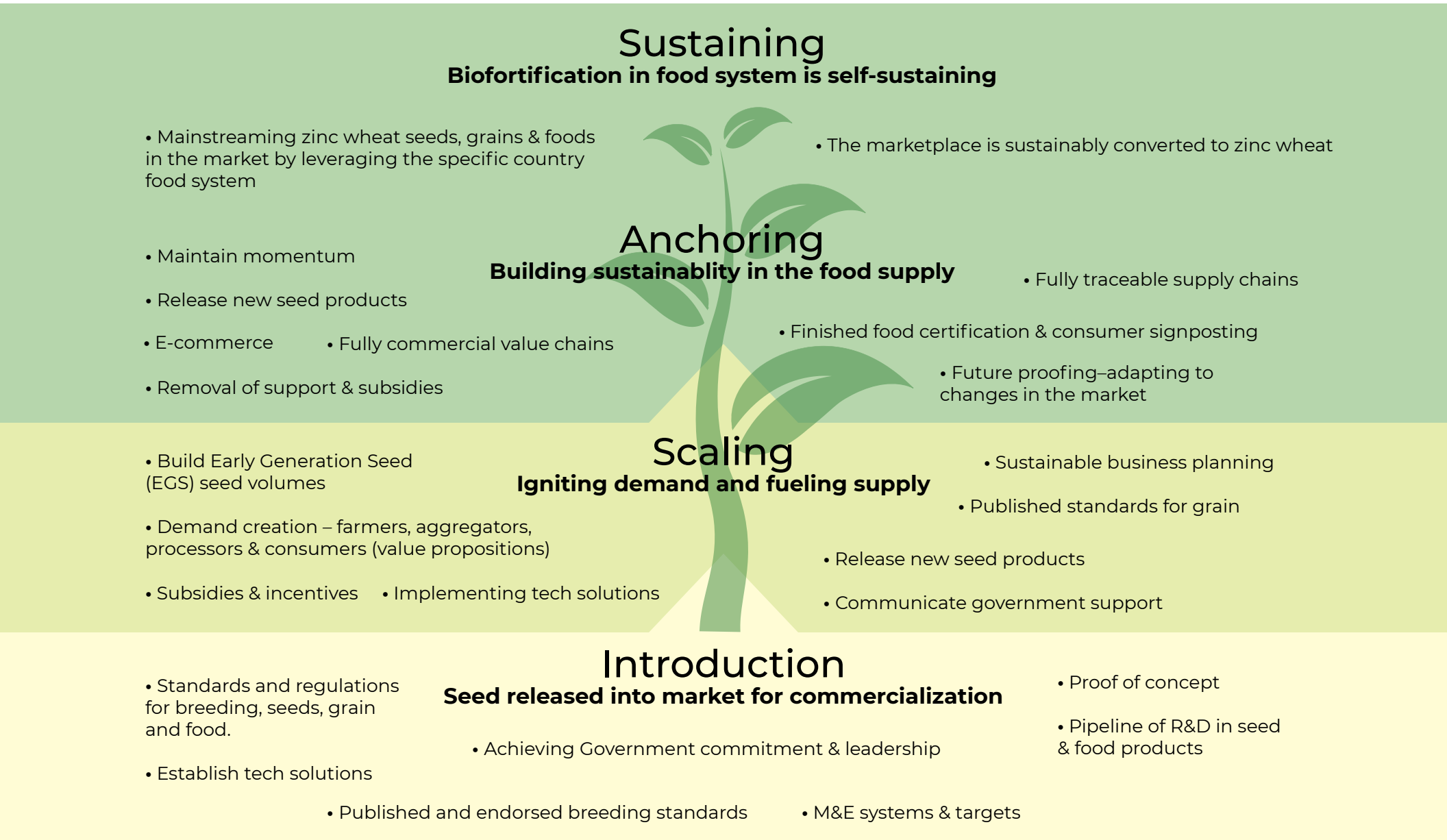
The HarvestPlus staple food system transformation model

HarvestPlus has developed a multi-component scaling model, from seed to grain to food on consumers' plates, of which scaling is an integral part. This model uses a variety of policy approaches, technologies, standards, and incentives to foster seed adoption, supply chain and food product development, and ultimately, a more-nutritious food system.

This brief focuses on the scaling phase—specifically fueling supply (strategy 1) mentioned above—toward sustainably embedding biofortification in food systems.

HarvestPlus scaling model in Pakistan

Summary of stages used to scale the reach of zinc wheat following the R&D and seed release phase



Scaling to reach 7 million

This timeline displays the key activities used to drive scale in Pakistan.

INTRODUCTION

2004 - HarvestPlus Pakistan zinc wheat breeding established with CIMMYT and NARS

2010 - 1st zinc wheat line introduced for field testing

Early Generation Seed volumes agreed with the Government

2013 - Government policy & advocacy

2014 - Government produces 2 tons of seed for research

SCALING

2017 - World Vision ENRICH project launched in Pakistan

Rural support programs begin training farmers on benefits of zinc wheat and farming practices

2016 - [Zincol-16 zinc wheat seed variety released on the market](#)

2015 - 950 farm demonstrations conducted

2018 - [Inclusion of zinc wheat in the Punjab Seed Corporation Production Plan 11](#)

[Scientific research shows zinc wheat improves nutrition and health of women and children](#)

2019 - [Akbar 19 zinc wheat seed variety released on the market](#)

2020 - HarvestPlus-PXD digital partnership launched to reach 100,000 Pakistani farmers

Punjab Seed Corporation plans production of 35,000 tons of Akbar-19 #1 variety in Punjab State

Integrated Food Systems project with Government of Canada starts

2021 - Nawab 21 zinc wheat seed variety released on the market

[Partnership with Family Farm Foods to produce 48 tons of zinc wheat flour in one year](#)

[HarvestPlus-GAIN partnership launches zinc rice commercialization project in Pakistan](#)

New global standards published for levels of zinc in grain

2022 - Projected 55,000 tons of seed produced through the private sector

Cropin digital farmer platform to be launched

Market share of zinc wheat projected to reach 20% of the certified seed sector



Costs to reach growers

The expert team of monitoring and evaluation specialists at HarvestPlus calculate the cost of reaching farmers each year. Costs include: advertising, educational and promotional materials; sales and marketing; trainings/meetings with farmers, agro-dealers, extension workers, trainers

etc.; promotional giveaways and incentives; seed production; field expenses (labor, travel, supplies etc.); staff salaries; office supplies; rentals; vehicles; and local transport. **In 2015, the average cost to reach one grower was USD 6.61; by 2020, that cost had fallen to USD 0.05.**

Critical success factors for rapid scale

- *Integrate zinc wheat into government policies.* Mandate minimum zinc breeding levels and seed quality; agricultural support policies that favor zinc-enriched wheat; incorporation of zinc wheat grain in public procurement; food fortification guidelines should include biofortification alongside industrial fortification.
- *Ensure quality early generation seed production.* Work with government regulators to ensure efficient production and seed quality, facilitated by digital and technological systems.
- *Provide options in the seed market with high quality end-use attributes including pest resistance, competitive yield, and profitability, creating a positive value proposition for seed businesses to sell the product.*
- *Use appropriate incentive mechanisms to ensure reliable quality seed production and farmer adoption.* Incentives can be financial subsidies, but showing commercial demand from businesses and consumers is more powerful to demonstrate market demand.
- *Ensure a continued pipeline of new seed innovation.* Investment in R&D, including ongoing adaptation to pests, disease, climate pressures, and food industry desired trait qualities.
- *Ensure farmer (customer) satisfaction with the product* to drive repeat purchase and collect feedback and farmer testimonials to use for advertising and promotion of seeds.
- *Ensure the grain from the seed produces quality product* for home consumption and the market. The flour is accepted and preferred by the major food processing industries.



Government endorsement and support in policy documents is critical. In Pakistan, the government has a close tie to agricultural research and was critical in early scaling by purchasing seed for field trials.

Next steps in maintaining growth in market share of zinc wheat seed and reaching more people with foods made with zinc wheat

- Continue the momentum in catalyzing larger seed volumes.
- Ensure a pipeline of R&D for new, better seed varieties; keep the market interested and meet food industry demands.
- Accelerate work on grain and food partnerships, through R&D in food products.
- Utilize technology for farmer platforms, digital aggregation networks, full supply chain traceability, food product certification and e-commerce for all value chain actors.
- Shift toward mainstreaming—the inclusion of nutrition in all breeding efforts. It is envisaged that mainstreaming of biofortification traits will be driven by high-throughput micronutrient phenotyping, and genomic selection coupled with speed breeding for accelerating genetic gains.
- Mandatory zinc thresholds set by the government for new releases of wheat seed.

Key lessons learned with zinc wheat in Pakistan

- Build a long-term strategy with annual targets; stick to the strategy but be prepared to adapt.
- Utilise technology. The creation of a "no-contact" delivery program proved game-changing in the face of disruptions due to the COVID-19 pandemic.
- Share, overcommunicate, and don't compete with other interventions; complement and support.
- Private sector engagement is essential because food systems are commercial—even in food aid procurement.
- Subsidies and technical assistance are short-term solutions to ignite scaling; however, markets must be designed to survive without them.
- Commercialization is key for sustainability; create a system that will stand alone without donor/ sponsor assistance.
- Take calculated risks. Avoid spending too much time thinking and looking for reasons not to act; failures make the best learning activities.



For more information about how you can be part of this important work, please contact [Jenny Walton](#).