



## Delivery of Zinc Wheat in Pakistan

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Staple Food	Daily Per Capita Consumption (all age groups, grams/day) <sup>1</sup>	Total Annual Production (thousand metric tons) <sup>2</sup>
Wheat	302 g/d	23,473
Rice	70 g/d	9,400
Irish Potatoes	37 g/d	4,104
	Daily Per Capita Consumption (grams/day) <sup>3</sup>	Zinc Density
Wheat	Children 3–4 years: 72 g/d Women: 208 g/d	Conventional Wheat: 25 parts per million (ppm) Zinc Target Increment: +12 ppm Biofortified Wheat Target: 37 ppm
		At the target level, biofortified wheat provides 70-100% of the Estimated Average Requirement (EAR).

<sup>1</sup>FAO Stat 2009; <sup>2</sup>FAO Stat 2012; <sup>3</sup>HarvestPlus Surveys

### Current Zinc Status

Prevalence of zinc deficiency (NNS 2011)	Children under five: 37%
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**Varietal Release:** In Pakistan, the breeding of biofortified zinc wheat is at an advanced stage at the Pakistan Agricultural Research Council (PARC), Islamabad. Three high-zinc leads with +6–14 ppm zinc were submitted to official registration trials in 2012/13, with release expected in 2015. The first biofortified variety, NR-421, is in the second year of testing in National Trials and is anticipated to be officially released in 2015 for general cultivation. Another lead, NR-419, is also high yielding, has more than 37 ppm zinc and 70 ppm iron, and is high in protein content as well. It is in the first year of testing in National Trials (Irrigated). The third potential wheat line, NR-439, also contains similar agronomic characteristics and in the first year of testing in rainfed areas of the country.

### First-Wave Wheat Candidates for Release in 2014/15

Variety Name	Grain Yield		Zinc Increase (ppm)		Agronomic Performance <sup>2</sup>		
	t/ha <sup>1</sup>	% over check <sup>1</sup>	Pakistan 2 sites	Asia 7 sites	Heading (days)	Maturity (days)	Height (cm)
NR-419	4.5	110%	+9.1 ppm	+6.6 ppm	93/94	130/127	105/81
NR-420	3.4	84%	+7.3 ppm	+6.8 ppm	86/86	128/119	119/104
NR-421	3.6	88%	+14.2 (>100%)	+13.9 (>100%)	78/78	119/114	107/95
Mean of 3 checks	4.1	100%	NA	NA	90/87	128/122	109/87

<sup>1</sup> Mean of 3 checks across 2 stations (Islamabad, Faisalabad) during 2010/11 crop season

<sup>2</sup> Under optimal production conditions (5 irrigations) / moisture stress conditions (2 irrigations)

**Strategic Factors Driving Delivery:** Wheat is the staple food crop in Pakistan and is grown on 8.63 million hectares with an annual production of 24.3 million tons. Despite its heavy consumption, the prevalence of zinc deficiency in children and women is common. The commercial wheat varieties are inherently low in zinc content, with an average of 25 ppm.

**Seed Commercialization:** The biofortified wheat seed will be multiplied and marketed largely through public and private seed sectors. The participating seed companies will also be encouraged to launch a special campaign for marketing of biofortified seed. At the same time, federal and provincial governments will be approached to launch

awareness campaigns through print and electronic media to promote the use of biofortified wheat flour for the reduction of malnutrition.

**Marketing:** Demand for zinc wheat is encouraged through coordination with the Provincial Agriculture and Health Departments by educating household decisionmakers, through extension agents, community health workers, and teachers, on the health benefits associated with zinc wheat. Building product acceptance is further facilitated by the agronomic superiority of the high-zinc lines in testing compared to currently grown varieties. Farmers will be educated on best cultivation practices for biofortified wheat through demonstration plots, fairs, meetings, and seminars.

**Stakeholders:** HarvestPlus collaborates with public and private sector, and nongovernmental organizations (NGOs), including the Ministry of Planning, Development and Reforms, Ministry of National Food Security and Research, Ministry of National Health Services, Regulation and Coordination, Provincial Food, Agriculture and Health Departments, PARC, Federal Seed Certification and Registration Department, Food and Agriculture Organization of the United Nations (FAO), World Food Programme (WFP), UNICEF, United States Agency for International Development (USAID), UK Department for International Development (DFID), farming community, Pakistan Flour Mills Association, and Pakistan Food Processors Association.

**Potential Impact:** It is projected that zinc wheat in Pakistan will enter the saturation stage of delivery by 2018. The projected zinc wheat market share will be 1.5% by 2018, and it is estimated that approximately 250,000 farming households will have access to zinc wheat.

**Cost:** HarvestPlus will spend an estimated total of US\$2.9 million for zinc wheat delivery activities, 2013–2018.

#### **Delivery Challenges and Recommendations:**

- Great potential for biofortified zinc wheat exists for its production and consumption by farmers and consumers in the country. This is attributed to the fact that the high-zinc trait is invisible and non-distinguishable. However, farmers will still need to be convinced to purchase the biofortified wheat. Extensive advocacy programs through electronic and print media will be required in the near future.
- At present, the wheat breeding program in Pakistan is exclusively in the public sector, and the private sector relies on public sector varieties, although this situation may change in the future. The HarvestPlus strategy entails engaging the private sector initially in testing of final products such as candidates for release. By gradually including germplasm at earlier development stages, the private sector can then establish zinc wheat testing programs and further develop intermediate-stage germplasm into their own zinc-dense final products as market opportunities emerge.