BREEDING CROPS FOR BETTER NUTRITION

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Plant breeding for micronutrient density gained legitimacy when micronutrient deficiencies were recognized as significant global public health issue; and major development challenge of the 21st century. Biofortification, the process of increasing bioavailable micronutrient density of staple crops through plant breeding aims at achieving a measurable, positive impact on human health. At the core of HarvestPlus breeding is a product development pathway that integrates human nutrition and socio-economic disciplines. HarvestPlus identifies target countries and target populations, based on where undernourished people are located and what they eat. Nutritionists determine how much of a micronutrient needs to be added to a crop to improve nutritional status. Plant breeders then begin the process of selecting germplasm and developing biofortified crops that meet those targets. As for novel traits, biofortified product concepts must consider factors associated with probability of success in achieving: i) *technological goals* with trait discovery and expression in adapted genotypes, ii) *crop improvement goals* to generate a biofortified germplasm product without compromising agronomic performance, nutrition, or end-use quality; and iii) *commercial goals* to guide the design and delivery of the technology. HarvestPlus has three project phases: i) discovery (2004-2008), ii) development (2009-2013), and iii) dissemination (2014-2018). While crop improvement is important in all three phases, there is a shift in emphasis in the second phase from assaying the genetic diversity spectrum to developing and implementing enabling technologies in trait diagnostics and establishing breeding programs for final product development, GxE testing in target countries and initiating breeding in national programs. An enhanced knowledge base allowed shifting from an emergent to a deliberate strategy and prioritizing 10 country/micronutrient crop profiles for six crops. Release of competitive micronutrient dense varieties for these crops is projected within the second phase. The state of the art of crop improvement under HarvestPlus is presented.

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