

Golden Rice and Other Biofortified Rice: Applying Agricultural Research to Address Human Nutrition Needs

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For centuries, breeders and farmers have bred and selected crops primarily on the basis of yield and agronomic performance. Based in part on the productivity gains from the Green revolution, the production of cereal staples, in particular, has kept pace with human population growth. However, the production of the more nutrient dense pulses, fruits, and vegetables have not kept pace, and in addition, the price for the poor for these and other food items has also risen disproportionately. There has been a marked rise or continued persistence of micronutrient deficiencies in populations dependent on single staples and with poor access to a diverse diet. High prevalence of iron deficiency and iron deficient anemia, high incidences of clinical and sub-clinical vitamin A deficiency are reported for billions of poor consumers, and most diets of the poor are deficient in zinc and other micronutrients. The idea behind biofortification, now organized in the overall HarvestPlus program, is to use agriculture research to address human nutrition and health needs, by developing staple crops (rice, wheat, maize, common beans, sweetpotato, and cassava, at first) with higher levels of iron, zinc, and provitamin A carotenoids. The approaches to improving the grain or food include germplasm screening and breeding and the use of transgenic approaches when sufficient levels of the needed micronutrient cannot be identified in the germplasm. All approaches are being investigated to increase the iron content in polished rice, for instance. A transgenic approach is the required method to produce provitamin A carotenoids in polished rice and this Golden Rice is in advanced stages of development.