



Two billion people worldwide suffer from micronutrient deficiency. Overnutrition and diseases like diabetes are also increasingly prevalent. In close coordination with national partners, IRRI is developing rice varieties with enriched micronutrient content, while also doing research on novel rice varieties and different rice types that can have a positive impact on health.

Biofortification

IRRI's extensive genetic resources and technical expertise enables the exploration of multiple pathways to biofortification, the process of improving the nutritional quality of food crops. This can be achieved through agronomic practices, conventional breeding, or advanced biotechnology tools such as genetic engineering and genome editing. These advanced techniques are used when micronutrient content cannot be significantly increased through conventional practices.

The IRRI Healthier Rice Program aims to develop and deploy biofortified rice varieties that can help address micronutrient deficiencies by providing 30-50% of the estimated average requirement for vitamin A, iron, and zinc to micronutrient-deficient women and children. These varieties are intended as a complementary food-based solution to existing nutritional interventions.

Research and development of genetically engineered Healthier Rice varieties are conducted in full compliance with national and international biosafety regulations.

Golden Rice

Golden Rice is a new type of rice that contains beta-carotene, a source of vitamin A, in its grains. Despite the success of interventions like oral supplementation, Vitamin A Deficiency (VAD) remains a prevalent public health problem affecting approximately 20% of Filipino and Bangladeshi children aged 6 months to 5 years. VAD compromises the immune system and can cause preventable childhood blindness.

IRRI and its partners, Philippine Rice Research Institute (PhilRice) and Bangladesh Rice Research Institute (BRRI), are developing popular local inbred rice varieties of Golden Rice which have yield, pest resistance, and eating qualities that are comparable to the original varieties.

In 2018, Food Standards Australia New Zealand, Health Canada, and the United States's Food and Drug Administration, assessed Golden Rice to be as safe and nutritious as ordinary rice but with the added benefit of beta-carotene. It is currently under regulatory review in Bangladesh and the Philippines.

High Iron and Zinc Rice

Anemia, commonly caused by a deficiency in iron or other micronutrients, is the leading cause of maternal mortality and impairs the cognitive development of children. Zinc deficiency is the leading cause of stunting. Nearly 40% of Filipino children aged 6 months to 1 year are anemic and 22% of Filipino preschoolers are zinc-deficient. In Bangladesh, anemia among preschool children is at 10.7%, while zinc deficiency is at 44% for the same age group.

With parental germplasm developed at IRRI and support from HarvestPlus, BIRRI released the world's first conventionally-bred zinc-rich rice variety BIRRI dhan 62, in 2013. A conventionally-bred high-zinc Philippine rice variety NSIC 2016 Rc 460 was approved by the National Seed Industry Council in 2016.

In 2015, IRRI scientists and collaborators demonstrated proof-of-concept for genetically engineered high-iron and -zinc (HIZR) rice. Confined field tests are underway to identify lead events for future multi-location field trials.



Low Glycemic Index Rice

The development of type 2 diabetes has been associated with the long-term consumption of high GI foods which can rapidly increase blood glucose levels. Rice, in general, had been categorized as a high GI food, but IRRI research shows that the GI content of rice varies from one type to another. Scientists from IRRI and the Commonwealth Scientific and Industrial Research Organization have identified the key genes that determine the GI of rice, offering rice breeders the opportunity to develop rice varieties with different GI levels to meet the health needs and dietary preferences of consumers.



For more information

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IRRI aims to improve livelihoods and nutrition, abolishing poverty, hunger, and malnutrition among those who depend on rice-based agri-food systems. In doing so, IRRI's work protects the health of rice farmers and consumers, and the environmental sustainability of rice farming in a world challenged by climate change. IRRI's work promotes the empowerment of women and supports opportunities for youth in an equitable agri-food system.

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